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The Outlook

Closer and Closer

BELIEVERS in the essential rightness of close Anglo-American collaboration, among whom we range ourselves, will welcome the official announcements, made last week by the United States Army Air Forces authorities in Washington and the British Air Ministry in London, of agreement to continue in peacetime the close co-operation in staff methods, tactics, equipment and research which existed during the recent war.

So many ties forged through the necessities of war are apt to be loosened if not actually severed when the immediate and urgent need for them has receded, and when selfish motives, temporarily submerged in a common aim, tend to rise once more. Examples of this are not lacking, either in private life or in national post-war affairs.

That the two great English-speaking nations have decided to continue the air co-operation established under the stress of war is one of the most encouraging signs we have had for a long time. The interchange of personnel cannot fail to have the most beneficial effect in both countries. Our only criticism is that the numbers envisaged are too small. From 30 to 40 on each side, increasing to not more than 100, strikes us as being rather inadequate for covering the many aspects of military aviation, the number of which is likely to grow during the coming years.

The intention is that the officers exchanged shall be students on courses, or on attachment to Command and Staff posts, and the training given under the new agreement will cover staff methods, tactics, equipment and research. The variety of subjects covered under these heads is so great that even 100 officers from each country would barely suffice to cover every one. However, it may be assumed that if future developments prove such a course necessary, the present limit figure may be increased. The great thing is that a start is being made quite soon.

Apart from its value in enabling the air forces of each country to become familiar with the methods and equipment of the other, the new agreement should assist materially in the difficult task of achieving a certain degree of standardization. It is not to be expected that the two nations will agree on every piece of equipment, but in the newer branches, in which neither has yet progressed far enough for designs to be "frozen," there is an excellent opportunity to standardize essential features, even if there are differences in certain less important details. That something can be done with great advantage even with existing material was demonstrated by the standardized cockpit of the Fairchild Naval Trainer which was shown at the Cleveland exhibition, and to which we referred recently. That is an excellent example of what can be done when representatives of the two countries get together.

In the field of research, the limits of which have not been officially defined, there is scope for enormous mutual aid by an interchange of information. A U.S.A.A.F. spokesman is reported to have said that co-operation in this sphere "will go just as far as either side wants it to go." As we pointed out a few weeks ago, in commenting on the value of Anglo-American co-operation, if one takes the whole picture into account, each of the two countries probably has as much to teach as it has to learn from the other, and if this view prevails at an appropriately high level, as we believe it does, there is literally no limit to what can be achieved.

Boscombe Down

SOME years ago, when referring to the Aeroplane and Armament Experimental Establishment, then situated at Martlesham Heath, near Woodbridge, Suffolk, we pointed out that the quality of the official testing done there was such that if an aircraft manufacturer wanted to impress us with the excellence of his latest product he would invariably say "Martlesham is very pleased with it."

Martlesham never was a very suitable airfield for

testing new types, and it appears likely that even if the outbreak of war had not made a transfer necessary, a different location would have had to be found for the testing of modern fast aircraft.

Boscombe Down, near Salisbury, was the site chosen, and the A. and A.E.E. has been operating there throughout the war. That the establishment has grown in size and, particularly, in the complication of its test procedures, was to be expected. It has retained its high reputation by tackling the much more intricate problems set by modern types of aircraft with the same thoroughness and skill as those which laid the foundation of its fame many years ago. During the war it was obviously out of the question to describe the work of Boscombe Down, since the latest aircraft and equipment were being tested there, but we felt that at the earliest possible opportunity our readers should be given a picture of the work which has done so much towards achieving air superiority. Consequently we requested Air Ministry permission to send editorial representatives to Boscombe Down for the purpose of collecting material for an article.

Facilities were readily granted, and the personnel of the establishment laid themselves out to show our representatives all there was to be seen. The article appears in this issue.

Here our readers may well say, in the American phrase which appears to have passed into our language, "So What?" We think they may be interested to know that to publish such an article is not quite as simple as it seems. The visit took place on November 27th, last year. The article was submitted on December 2nd, and then began a weary wait for it to be cleared. Perhaps in our impatience we failed to take into account that three departments were involved: the Ministry of Production, the Air Ministry and the Admiralty, each of which had to watch the particular aspects of the work with which it is concerned before passing text and illustrations on to the next department.

So wide is the field now covered by Boscombe Down that the number of specialists who had to "vet" the article was legion. Perhaps in each department the man concerned was out, or at a conference, or busy on even more important things. Whatever the reason, we did not get the article back until December 23rd, by which time we were in the middle of bringing out two issues in one week on account of the holidays.

The point of all this is that we trust our readers will study the article with appreciation. It has passed through many exalted departments before it could safely be released to a wider circle—with deletions. We can only hope that, in due course, we may be in a position to say not only that "Boscombe Down is Pleased," but that our readers are pleased.

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NAVAL EXERCISE

Fitters ministering to the Rolls-Royce Griffons of Fairey Firefly I fighter-reconnaissance aircraft are not distracted by a game of deck hockey. The scene is the flight deck of H.M.S. *Ocean*.

BOSCOMBE DOWN

"Flight" photograph.

An impromptu formation by A Squadron, A. and A.E.E. The Meteor III with zero-length R.P. rails is flown by Wing Cdr. J. R. Baldwin, D.S.O. D.F.C.; the Vampire I by Sqn. Ldr. J. Zurakowski and the Spitfire 24 by Sqn. Ldr. R. J. B. Roach.

Work and Organization of the Aircraft and Armament Experimental Establishment

By H. F. KING, M.B.E.

ON September 9th, 1939, because of the vulnerability and inadequacy of Martlesham Heath, the Aircraft and Armament Experimental Establishment was transferred to Boscombe Down on the Plain north of Salisbury. By this time "Martlesham" and "A. and A.E.E." had become synonymous and either title was accepted throughout the world as connoting veracity and thoroughness in the testing of military and civil aircraft.

Martlesham was sustained by a tradition dating from 1917 when the station received an R.F.C. Squadron which had been testing aircraft at Upavon. This unit was the nucleus of the Aeroplane Experimental Station, supervised by Sir Bertram Hopkinson, commanded by Major Cooper and with Captain (now Sir Henry) Tizard as Chief Technical Officer.

The reputation of the Aircraft and Armament Experimental Establishment, as it came to be called, was not founded solely on unimpeachable pronouncements concerning aircraft and weapons; its annual Contractors' Guest Nights endowed it with catalytic propensities, gratefully acknowledged by Service and Industry alike. These historic functions and the equally renowned golf matches were suspended during the war, but with characteristic energy Air Commodore H. P. Fraser, C.B.E., A.F.C., the late Officer Commanding, revived the dinner on November 8th last year, as already recorded. The golf matches have likewise been reinstituted.

A short time ago *Flight* visited the A. and A.E.E., now of course under Ministry of Supply control, to describe for the first time in any detail its activities and organization. The stay was marred by dual depressions, one meteorological and the other—due to the imminent departure of Air Comdre. Fraser to an Air Ministry post—metaphysical. At a farewell party, which happened to coincide with our visit, the C.O. spoke of his hopes and fears concerning the Establishment for which he has worked so tirelessly and to such good effect.

Accommodation for men and machines is at present dismally inadequate, but within a year a real change should be apparent. The rebuilding plan calls for a new barrack block to displace the Nissen huts of the lower camp, a Technical and Administration Block instead of scattered huts, an Electrical and Instrument Laboratory, new hangars (including a 350-foot structure for the Brabazon I) with crew rooms and flight offices, and a recreational centre of the newly approved style. Particularly capacious and elaborate fuel storage is proposed.

A new runway to supplement the present one of 3,000 yards and suitable for the "Brab. I," is another urgent requirement, and Air Comdre. Fraser hoped that this might begin to materialize when the new Filton east-west runway is finished. When large aircraft are operated at Boscombe from the present strip wind forces must be very carefully checked; tests of the Tudors at high loadings have already been handicapped by cross-winds.

Deficiencies in accommodation and facilities at Boscombe are more marked than those of organization, though the present scheme, to be described, is not ideal. Before examining this it is necessary to set down the major responsibilities of the A. and A.E.E. The principal of these for which the Establishment is best known, is the determination of the aerodynamic and armament characteristics of prototype aircraft and variants. Arising from trials, modifi-

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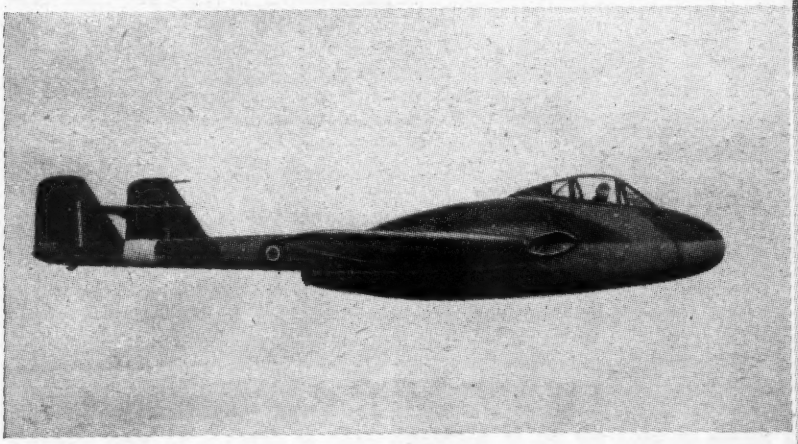
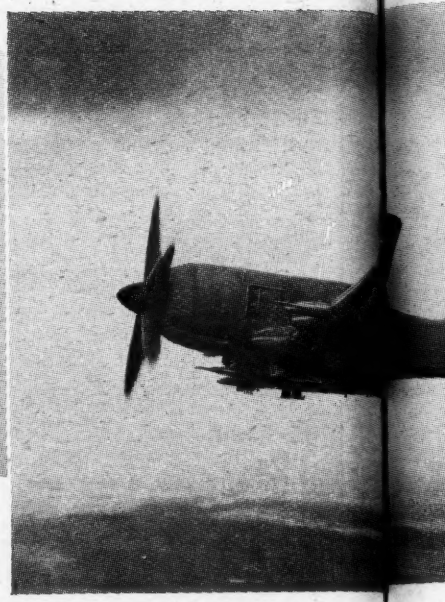




A skilled exponent of high-speed flying on a favourite mount—Sqn. Ldr. Zurakowski and the Vampire.

cations may be proposed, and when these are incorporated repeat tests must be made until the aircraft is satisfactory.

Apart from establishing the suitability of a machine as a gun, bomb or R.P. platform, Boscombe does acceptance tests on all forms of new and modified armament installations in prototypes and in standard Service aircraft. It also reports on various armament stores, including bombs, R.P.s, pyrotechnic devices, ammunition and chemical containers. Power plant installations are tested for suitability of airscrews, cooling, fuel and oil systems, etc., and radio and navigation facilities are checked.

A Civil Commitment

A vital function of the Establishment is to determine the characteristics of an aircraft *relative to its Service role*, embracing all aspects of performance and maintenance. Of rising importance is a commitment to perform, on behalf of the Air Registration Board, Certificate of Airworthiness tests of civil aircraft ordered by the Ministry of Supply, and to conduct the acceptance tests of these machines.

Finally, Boscombe, by its very nature, is a rich source of data for the advancement of aircraft development.

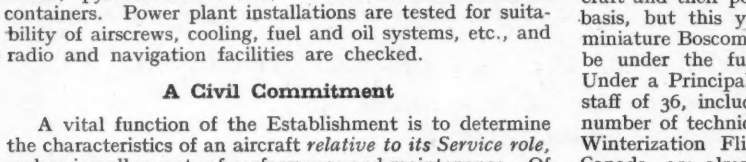
Under the Chief Superintendent, Mr. E. T. Jones, are four "Wings" concerned with Performance (superintended by Mr. Hufton), Armament (Grp. Capt. C. F. S. Fraser), Engineering (Mr. B. D. Clark), and Flying (Grp. Capt. R. C. Dawkins). Each of these officers has charge of several sections, and in the case of the Superintendent of Flying, of squadrons. The Signals-Test, Navigation and Photographic sections and the Drawing Office are under the direct control of Mr. Jones.

Boscombe's activities, like its influence, are wide-spread and will become more so. Hitherto tropical testing of aircraft and their power plants has been done on an *ad hoc* basis, but this year a special Tropical Testing Unit—a miniature Boscombe—is to be set up at Khartoum and will be under the functional control of the Establishment. Under a Principal Scientific Officer, this unit will have a staff of 36, including a Squadron Leader (Flying) and a number of technicians. Royal Air Force personnel of the Winterization Flight, operating to such good effect in Canada, are already under the administrative control of A. and A.E.E.

Grp. Capt. Dawkins, Superintendent of Flying, keeps a vigilant eye on the conduct of all test-flying at Boscombe, and when necessary, gives his opinion on aircraft characteristics. He has control of three squadrons: A Squadron being responsible for fighters and light aircraft; B handling medium and heavy machines; and C, naval types. The "S. of F." is further responsible for the control of the Intensive Flying Development Flight, Maintenance Wing and Flying Control. The Civil Aircraft Test Flight is an offshoot of B Squadron, but is now regarded as a separate unit and has its own office.

Commanded by Wing Cdr. J. B. Baldwin, D.S.O. and Bar, D.F.C. and Bar, a 2nd T.A.F. fighter-bomber pilot with sixteen air-to-air victories, A Squadron has a stronger establishment than either B or C and has lately dealt with a greater number of types. These have been chiefly fighters, but there have been a few trainers like the Prentice and Desford, and A.O.P. aircraft.

"Johnny" Baldwin holds that the essential attribute of a test pilot is an absorbing interest in his job: he must live for flying. Operational experience, however, is a very great asset. Also on the strength of A Squadron are Sqn. Ldr. W. Price-Owen (with eight victories), Sqn. Ldr. J. Zurakowski, Sqn. Ldr. P. Barthropp, D.F.C., Sqn. Ldr. L. Stark, D.F.C. and Bar, Sqn. Ldr. R. J. B. Roach, and Flt. Lt. A. E. Gunn. Three of these pilots have



Lt. Cdr. Ievers tests the bomb doors of a Sea Mosquito in murky weather.

"Flight" photograph.

"Flight" photographs.

The Firebrand IV (centre) is flown by Lt. Cdr. Hawkes. Above is Lt. Hickson, on a Firefly IV.

passed through the Empire Test Pilot's School and others have had experience as firms' production test pilots. All new pilots will in future take a course at the school.

As in the other squadrons there is a parallel staff—known as A Squadron Technical Section—of civil servant technical officers who have a very close liaison with the Ministry of Supply, and are responsible for the interpretation of, and for drawing conclusions from, results obtained in the air. Often these officers are able to suggest technical improvements to firms' design staffs; as an instance, when the stick force of a certain fighter began to rise unduly they proposed the fitting of spring tabs. These were adopted with benefit.

When a new aircraft arrives for A Squadron the Technical Section hands to Wing Cdr. Baldwin a list of tests required by the M. of S. One pilot is given primary responsibility for the aircraft during its stay with the Squadron, though it is never flown by fewer than three, including Wing Cdr. Baldwin, and the report on its behaviour is, in fact, the findings of a "tribunal." The responsible pilot must see his charge through c.g. tests, weighing, instrumentation and checking, watch serviceability and ensure that appropriate photographs are taken to illustrate the report.

After initial engine trials, if the power plant is of a new type (which, in practice, it rarely is) handling trials are commenced. These are qualitative and quantitative. In the first case the pilot must discover what he can about the flying characteristics of the aircraft without reference to instruments; in the second he has recourse to such devices as the stick-force indicator, accelerometer, Machmeter, and possibly an automatic observer.

Performance tests embrace partial climbs and battle climbs to service ceiling; checking of speed and consumption in level flight at several heights; endurance tests (fighters often land at Boscombe with tanks nearly empty); and A.S.I. position error determination at all heights.

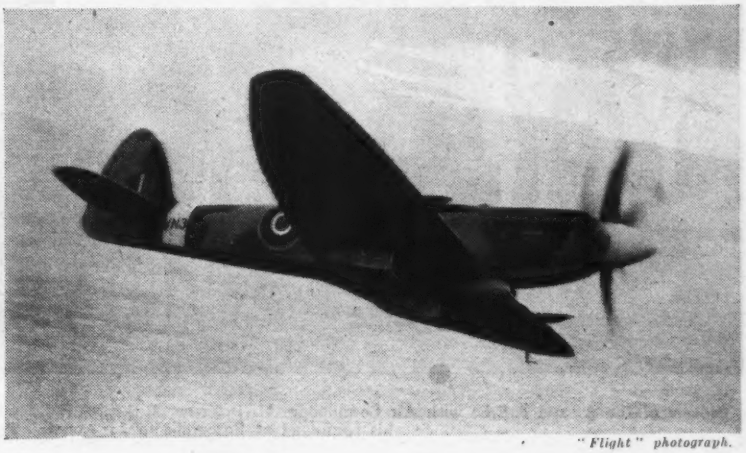
The foregoing sequence of tests is particularly exhaustive and imposes very heavy demands, especially upon engines. In consequence, forced landings have been comparatively common, as in the very early days when the Merlin and Griffon were re-rated for 25 lb boost. So, for the next series of tests with external loads, a second aircraft is usually required.

Checks are now made on handling characteristics with auxiliary tanks, rocket projectiles and bombs, and are followed by trials to assess the functioning of the various weapon installations. Guns and R.P.s are fired in Lyme Bay, and for bombing trials Porton Ranges normally serve. These trials, it must be understood, are solely to check the *functioning* of equipment. Accuracy trials demand special observation and for assessing the results of R.P. and gun firing A Squadron uses the range at Imber. Here, apart from an ordinary target in the chalk are some derelict tanks.

No "g suits" hang in the wardrobes of the A Squadron pilots, though 5g is often reached during stick-force tests. The A. and A.E.E. "height record" at present stands at 48,200ft, attained by Flt. Lt. Williams flying a Spitfire in 1943. This, of course, will soon go by the board when the pressure-cabin Meteors begin to come through.

Taming the Rogues

One of the jobs which falls to the lot of the Squadron is the flying of "rogue" aircraft—usually Squadron machines which exhibit some apparently unaccountable abnormality—to establish the reason for their behaviour. Demonstration flights and shoots are undertaken for the Imperial Defence College and Staff College, and although the Boscombe pilots have received less public notice than



"Flight" photograph.

A Griffon-engined Spitfire 24 flown by Sqn. Ldr. Roach of A Squadron

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firms' pilots they are exceptionally skilled. Sqn. Ldr. Zurakowski, for example, has made a name for himself by his demonstrations of the Vampire and Martin-Baker MB.5, and it was he who introduced really slow flying on jet and high-speed aircraft as a feature of his exhibitions. He is, incidentally, a diligent student of technical matters and is one of several Polish officers at Boscombe, all of whom were valued highly by Air Comdre. Fraser, who hoped for some official recognition of their services.

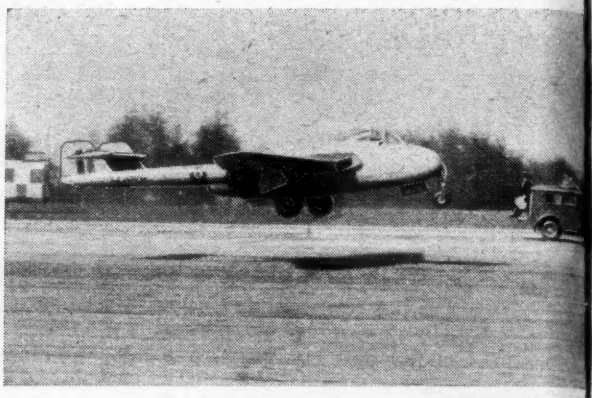
Remarkably enough, Boscombe pilots may log less flying time than pilots serving in squadrons, weather suitable for normal cross-country work often being impossible for test-flying. On the other hand, they do gain experience on a diversity of types and are always eager to try something new or different. "Zura," for instance, is acutely disappointed that he has not had an opportunity to fly more German machines. Grp. Capt. Wroath who preceded Grp. Capt. Dawkins as Superintendent of Flying, had well over 200 types in his log book.

The Newest "Jets"

When we called on A Squadron they had in their hangars a selection of Spitfires, Tempests, Vampires and Meteors. One Vampire was a Nene-engined prototype, the existence of which was only lately announced. A second Vampire, this time bearing Swiss markings, was flying (highly successfully it seemed) with its full external load of 500 lb bombs under the outer wings and eight R.P.s inboard. A short-nacelle Meteor III, seen in the heading photograph, was equipped with zero-length rails for R.P.s. Another was a short-span Mark IV.

To the lot of B Squadron, commanded by Wing Cdr. J. G. Mann, falls the testing of military aircraft adequately classified by the Wing Cdr. himself as "from Mossies up." In this he has the help of Sqn. Ldr. J. C. K. Sutton, Flt. Lt. T. W. Morren, Flt. Lt. J. D. Baker, Flt. Lt. J. H. Pinckard, F/O. P. S. Gees, and W/O. K. R. Price.

The Lincoln has been one of B Squadron's major responsibilities in recent times, and now the Brigand torpedo fighter is being put through its paces. The Hastings is awaited. In the main, the work of B Squadron runs parallel to that of A Squadron though obviously, on a machine of Lincoln calibre, armament tests on bomb and gun installations are very elaborate, even when only "worst possible" or "suspect" bomb loading conditions are checked.



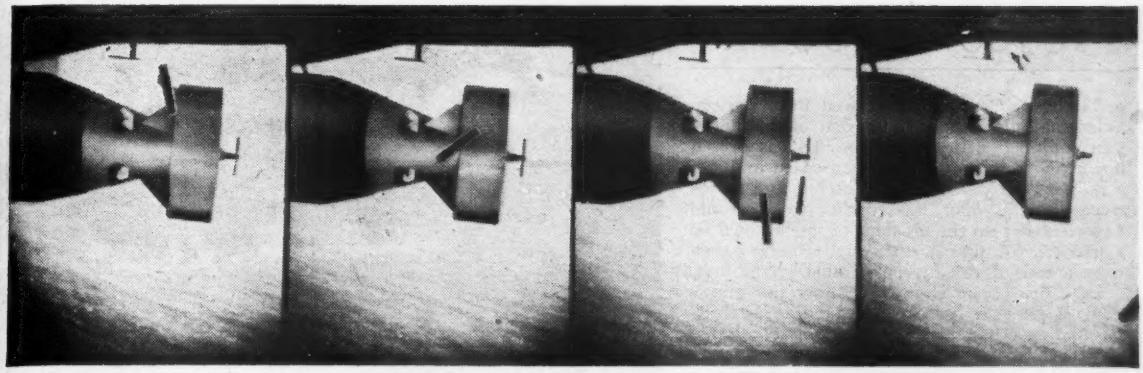
A Humber van bearing a "batsman" drives down the runway at 30 knots, simulating deck-landing conditions for the pilot of a Sea Vampire.

For performance tests very full automatic observer equipment is used to record cooling conditions, fuel flow, etc. Ashley Walk range, near Fordingbridge, has been used for bomb tests (the early Tallboy and Grand Slam trials were done by A. and A.E.E.) but as later emphasised by the Superintendent of Armament, the provision of ranges is now a very serious problem indeed, and one apparently impossible of solution. As in all departments of A. and A.E.E., B Squadron makes extensive use of photography to provide test data and records. The release of drop tanks, for instance, is photographed from a Firefly or Mosquito.

B Squadron has lately been flying a handsome new Brigand finished in Coastal Command white, and fitted with a new clear-vision cockpit canopy. Tests to check

"Flight" photograph.

Officers of the A. and A.E.E. with Air Commodore H. P. Fraser, C.B.E., A.F.C. (centre). The Air Comdre. lately handed over his command at Boscombe to Air Comdre. Pelly.



An example of the value of cinematograph records: ejected 20 mm. shell cases pass through the tail drum of a bomb and remove the arming vane.

the ejection of the canopy are to be made using a test rig composed of four Merlins coupled to an airscrew which gives a wind speed of about 290 m.p.h. This equipment was originally introduced for flame-damping tests.

Recently B Squadron have been doing spraying tests with D.D.T., using a Lancaster carrying two 400-gallon long-range tanks filled with the liquid insecticide.

The Civil Aircraft Test Section has four pilots: Sqn. Ldr. H. G. Hazelden, D.F.C., Sqn. Ldr. J. A. Jarvis, D.F.C., A.F.C., Sqn. Ldr. S. N. Kulezycki and Flt. Lt. B. C. Wardell. To these officers falls the very responsible task of proving all new British transport machines, and their greatest contribution to aircraft development in this country has undoubtedly been research into the problems of asymmetric flight, in particular the study of engine-cuts at take-off. In evolving testing methods they have used a Fortress. They still employ a Dakota for this work, and as long ago as 1944 were experimenting with a Mitchell to determine the behaviour of a tricycle undercarriage under asymmetric conditions at take-off and landing. The first post-war British type to receive their attention was the Viking, for the testing of which A. and A.E.E. pilots were sent to Wisley. Now free use is made of the famous 3-mile Woodbridge runway, close by the old home of the A. and A.E.E., for engine-cut tests. Here the Tudor I, the prototype of which received its C. of A. on October 12th this year, did its asymmetric flight trials. Should an engine, or engines, be cut on a take-off from Woodbridge the runway is long enough for any normal aircraft to be brought to a stop, or for the take-off to be continued.

"Flight" photograph.

The Superintendent of Flying, Group Capt. R. C. Dawkins, discusses the Brigand with Wing Cdr. J. G. Mann, commanding B Squadron, in the presence of B Squadron pilots: Sqn. Ldr. Sutton, Flt. Lts. Morren and Baker, F/O Gees and W/O Price.

"Flight" photograph.

Air Commodore Fraser consults the Location Board, an important feature of his "Stats. Room."

The Royal Navy is very adequately represented at Boscombe by Lt. Cdr. J. A. Ievers, O.B.E., Lt. Cdr. G. F. Hawkes, Lt. K. R. Hickson and Lt. K. G. Talbot, who fill the present establishment of officers for C Squadron, responsible for testing all naval aircraft. C Squadron is subject to the same technical direction as A and B Squadrons, but has a number of ratings on its strength for the maintenance of its aircraft. A naval engineer liaison officer reports fortnightly direct to the Admiralty and watches the peculiarly naval aspects of maintenance and stowage, particularly inspection and wing-folding. On a carrier the D.I. assumes a special importance.

C Squadron must assess the deck-landing characteristics of all new naval aircraft. Should these be unusual a carrier is made available, as was the case when the second series of trials with the Sea Vampire were conducted from H.M.S. *Triumph* last year. To C Squadron, in fact, must go the credit for having developed a new technique of landing jet fighters on a carrier's deck. During initial landings trials with the Sea Vampire the aircraft was brought in nose-high and stalled on to the deck, but a flat approach proved to be a preferable technique, with a small rate of descent whilst crossing the round-down and—to make the fullest use of the tricycle undercarriage at touch-down—flying straight into the arrester-wire area.

Deck-landing conditions are simulated at Boscombe by

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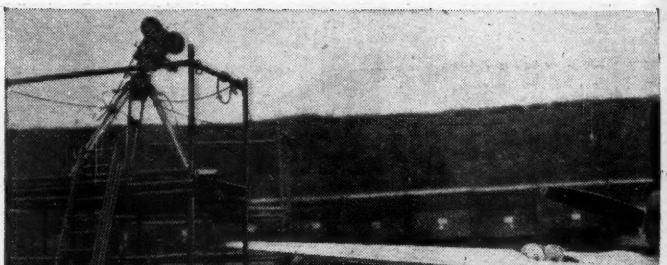
a "batsman," usually borrowed from Lee-on-Solent or Ford, riding at the rear of a Humber van equipped with an A.S.I. This is driven down the runway at the desired speed and can simulate "30 knots over the deck" and reproduce for the pilot the conditions he would experience up to the moment of touch-down on a carrier. A film of these activities is taken from a second van driven parallel to the first.

Lt. Cdr. Ievers showed us how the pilot's view is assessed from a deck-landing aircraft. Painted on a hangar door is a highly creditable representation of a Light Fleet Carrier as seen 400 yards from the round-down and from a height of 150 feet. By the use of this picture, field of view can be accurately measured from a parked aircraft.

Many of the more recent types of Service aircraft have been designed for, or adapted to, naval requirements and C Squadron is already familiar with their characteristics. They have handled Sea Mosquitoes, Sea Hornets, Sea Vampires, Seafangs, Sea Furies, Seafires (including Mk 47), Firefly IVs, Spearfish and Monitors, and have proved the remarkable effectiveness of the dive-brake airscrew on the Griffon-engined Barracuda V. This device is not a landing aid, as it introduces an unpleasant yaw at low speeds. The deck-landing possibilities of the Meteor have been studied and the Short Sturgeon is awaited.

Gunnery, bombing and R.P. tests are run as in A Squadron, but torpedo-dropping is left to the Air Torpedo Development Unit at Gosport. Handling of torpedo-laden aircraft is, however, an important A Squadron commitment. All marks of torpedo air-tails are checked. A carrier radio beacon is installed at Boscombe for aircraft radio trials and other homing equipment is tested in Lyme Bay.

In a block which houses the O.C.'s officers we met Grp. Capt. C. F. S. Fraser, Superintendent of Armament, who explained how control in his Wing is de-centralized into the hands of Senior Technical Officers responsible for bombing, gunnery and rockets, and outlined the work of the Senior Armament Research Officer, Mr. Standon, and the Station Armament Officer, Sqn. Ldr. Newman, who has charge of ranges. The S.B.T.O., S.G.T.O. and S.R.T.O. are respectively Wing Cdr. Theed, Wing Cdr. Priest and Lt. Cdr. Bagley and the Naval Armament Liaison Officer Lt. Cdr. Maclaghlan.



A high-speed cine camera rigged to record the behaviour of 20 mm ammunition belts in a Spitfire 24.

Instructions for the test of armament are received from D.Arm.R.D. (Air) at the Ministry of Supply and although a standard work of reference is available for armament, as on aircraft testing, special methods of test may have to be evolved. Here the Armament Research Section is called upon, for, apart from assisting the Bombing, Gunnery and Rocket Sections in scientific problems and analysing the results of trials, this is responsible for working out new test procedure. The plotting of R.P. trajectories, gun kinematics, and the measurement of strains imposed by armament on structures and mountings are some of the problems studied.

Firing Tests

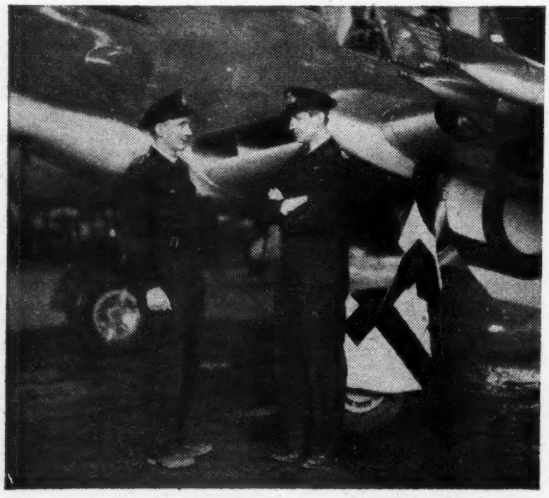
The Armament Wing has the use of very modern stop-butts, built late in the war, and has various "hack" aircraft, a Lancaster, for example, for turret trials. When instructed to test a new gun installation, officers of the Wing first examine it in detail for superficial faults. Following this, about 1,000 rounds are fired to check blast effect, muzzle flash, weaknesses in mounting and effects on structure. A similar quantity of ammunition is expended in the air, in straight and level flight, and at very high speeds, in the last instance to study aerodynamic effects, which can have serious ballistic results. Before the installation is cleared for Service use it is tested under combat conditions, particularly to check feeding, before a last inspection for incipient or actual faults. Sight vibration due to gun firing is one trouble which must be watched for in present-day installations.

Bombing trials likewise present peculiar problems. When released at very high speeds (tests have been made at well over 500 m.p.h. and at diving angles of 60-70 degrees) bombs, particularly if externally stowed, often display serious instability. Cine photography is used for the study of this phenomenon.

The problem, however, over which the Superintendent of Armament appears most exercised is that of providing ranges, particularly one suitable for bombing at very high speeds and great heights. The public, the Ministry of Town and Country Planning and other Services all seem to be in opposition or competition.

It emerged during a chat on R.P. testing that an aircraft with a new installation for launching these projectiles is flown to Pendine and landed on the sands for static firing tests. Subsequent air tests, before preliminary safety clearance is given for Service use, include about thirty-six "shoots" at various speeds, angles of dive and ranges.

Mr. B. D. Clark, Superintendent of Engineering, heads



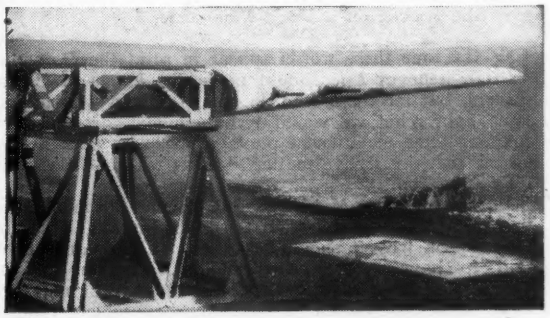
Lt. Cdr. Ievers (right) discusses full-load tests of the Firefly IV with one of his pilots.

BOSCOMBE DOWN

a staff composed mainly of civilians. Under his control comes the Defects and Installations Section, which investigates minor accidents, and reports and remedies faults, and the Engineering Technical Section, which studies carbon monoxide contamination, cabin heating, gun heating and cooling, flame damping and similar problems. Likewise in the Engineering Wing is the Mechanical Engineering Section. Here new types of aircraft are appraised from the engineering standpoint, special attention being paid to simplification of maintenance and servicing. In addition there is a special section which studies electrical systems and their defects.

The Superintendent of Engineering, further, has control of the Intensive Flying Development Technical Section which works with the I.F.D. Flight in turning intensive air-testing to the best account. It is usual for one or two early aircraft of a new type to be flown, within as short a time as possible, for 100-150 hours. Experience of immense value to the Service is thus accumulated. The Naval Engineer Liaison Officer, of whom mention has already been made, transmits advance information on engineering matters to the Admiralty.

Separate sections are responsible for Signals and Navigation equipment on aircraft arriving at Boscombe to be passed out, and there is a busy Photographic Section which handles the various types of cine and still cameras now so vital to the work of the A. and A.E.E. One type of ultra high-speed cine camera takes 3,000 frames a second; another is used for stereoscopic photography and a third is specially adapted to record take-off and landing characteristics. The Photographic Section is further responsible for camera installations on aircraft arriving for test.



A test rig used for static functioning trials of a twin-20 mm. gun installation in the wing of a fighter.

Head of the Maintenance Wing, under the Technical Direction of the Superintendent of Engineering, is Wing Cdr. Fletcher.

A preferable title to that of Superintendent of Performance would be "Superintendent of Aircraft Tests." Mr. Hufton, who succeeded Mr. Scott-Hall as "S. of P.," controls the Aircraft Research Section, which studies testing technique, e.g., measurement of speed by radar, the Civil Test Section and the Engine Performance Section. Reports are channelled to the "S. of P." from A, B and C Squadrons through Messrs. Truran and Cushing, the Senior Handling and Senior Performance Technical Officers.

The Civil Test Section will soon become the Civil Test Flight, with an authorized establishment. For the time being much of the maintenance work on civil aircraft is being done by the firms concerned and the principal companies have resident representatives at Boscombe.

Statistics

It will have been gathered that the workings of the A. & A.E.E. are vastly more complex than those of a normal R.A.F. Station and, in view of the importance of his commitments, Air Commodore Fraser had been at great pains to assess the loading and capacity of his organization. He was unashamedly a statistician and business-efficiency enthusiast, and the "Stats. Room," his pride and joy, had greatly lightened his task of running the establishment. Every detail he designed himself, utilising the cheapest materials, such as strips of paper, price tags and paper clips. Each type of aircraft he "charged" a number of points, according to the man-power needed to maintain it, one point equalling 450 man-hours, and it was possible within practical limits to gauge the load of work. "Continuity" and "skill" factors were introduced in assessing the capacity of the station.

Statistical returns were made on special forms and the data presented were reproduced graphically on wall boards before being concentrated in a hanging-file system from which at an instant's notice, Air Commodore Fraser could quote the history of any aircraft after its reception at Boscombe.

Thus his "Stats. Room" recorded the influence of all important factors on the everyday work at what is probably the most interesting air station in the world.

THE STORY OF A.T.A.

STRIKING a nice balance between the simple factual record and any over-dramatized or glamorized account, *Brief Glory* * gives very nearly the perfect picture of six years of work by Air Transport Auxiliary. And, as such, it was badly needed. For, despite the publisher's words on the dust-cover concerning the organization's "romantic rise to fame," the A.T.A. somehow never managed to achieve any appreciable public recognition. Even in 1945 the ferry pilot's uniform still mystified the ordinary citizen, who, peering at the insignia, supposed that its wearer must belong to the Tasmanian, Tanganyikan or Turkish Air Arm.

Perhaps even the publication of this book will do little to increase the ordinary person's knowledge, since the author has been intent on capturing the true spirit of the organization rather than on straining to appeal to wayward popular tastes. To anyone who was directly or indirectly concerned with the various ferry pools, the historical vignettes dealing with the life and character of those at Whitchurch, Hawarden, and so on, will be appreciated to the full. Nicely balanced variations of personal report, semi-apocryphal story and plain fact are used with good effect. From the mud of Hawarden to the terrifying meteorological situations in the Kirkbride area, the ferrying picture at each has the stamp of realism. The photographs, also, have been well picked; they are neither too posed nor too amateur, and the personalities are as their friends in the A.T.A. or at the M.U.s and factories knew them.

To each person who knew the A.T.A. there will seem to be omissions—such are inevitable in a book which is not arranged to run into a whole series of volumes. There are, too, some minor anachronisms in the record of the A.T.A.'s earlier history, and one or two names have somehow been missed from the roll of A.T.A. aircrew—R. A. F. Farquharson, for instance, who left to join the Service and became a 41 Group R.F.S.O. at Kirkbride, and J. C. V. K. Watson, who eventually lost his life on blind-approach instructional work with the Navy. I mention those two because they were among the very early pilots of the A.T.A., and because "Watty," with F. D. Bradbrooke, Carill S. Napier and myself, was one of the first to be tried out at C.F.S. on "real" aircraft—and very frightening it all was for us. I was the baby in experience among them—temporarily replacing, if I remember rightly, Keith-Jopp, whose disabilities Upavon would not at first agree to face.

Brief Glory gives a very real idea of the meaning of ferry flying—which was a much tougher job than anyone outside the business could possibly imagine. The combination of new types, strange country and doubtful weather could, faced day after day, eventually knock the bottom out of anybody's nervous system. And in the early days, at least, the pilots took practically no leave; it was a seven-day-a-week job. I left the A.T.A. in October, 1940, on commissioning in the R.A.F.V.R. as a test pilot; my next five years' work was, by comparison, quite a rest-cure. H. A. T.

* *"Brief Glory," by E. C. Cheesman; Harborough Publishing Co., Ltd., 15s.*

D

American Newsletter

Air Transport Deflation : B.O.A.C.'s Popularity : The Light-Aircraft Market : Line-shooting "par Excellence"

By "KIBITZER"

SOME of the forecasts that have been made in these news letters during the last year seem to have come true. They did not always happen when they were expected—but that would be asking too much in such a pleasantly unpredictable country as the United States. Nevertheless, it is nice to feel that what was said wasn't always nonsense.

For instance, the airlines are now finding that they have vacant seats and are laying off staff. Personnel reductions by T.W.A., Colonial and Pan American Airways have, in some cases, been as high as 20 and 30 per cent, and T.W.A. cancelled an order for eight Constellations and some D.C.4s, while Western Airways, who operate up and down the West Coast, cut their orders for new machines by 50 per cent. On the stock market, the airline shares have slumped sharply, and there is an all round reassessment of values. In view of the over-optimism of last summer this is probably a good thing.

While this rather unsatisfactory state of affairs worries the U.S. airlines, B.O.A.C., with their Constellations, are steadily building up an excellent reputation. Despite the current unpopularity of air transport, B.O.A.C.'s courtesy, comfort, reliability, passenger handling and service generally are, even at a time when things British are none too popular here, receiving high praise from everyone who has travelled with the Corporation.

Such a situation is doubly gratifying to those of us who supported the policy of buying, as a temporary measure, American aircraft—maintaining that it was better to have American machines than none at all. Unfortunately, some of the Elders of the British aircraft industry still seem to be sore at those of us who held this belief. Quite what B.O.A.C. would be flying now if they had not had the courage, foresight and backing to get the "Connies," goodness knows. If the sad stories current over here on the delays that are besetting our present Atlantic types are true, the orders to Lockheed and Boeing have saved the day and will continue to do so for some time.

Let us admit that we were in a tough spot and had to accept the lesser of two evils, and chose a course designed to tide us over a particularly bad time in our aviation history. Nobody liked the idea, but it is important to realize that this policy has enabled us to avoid wasting our energies building the "fill-in" types that would have been necessary to cover the next five years, and if it has resulted in our being able to put more effort into designs for 1950, it will have served an excellent purpose. Because of the great strides that are now taking place in both engine design and aerodynamics, anything that goes into the air between 1947 and 1950 must be of a stop-gap nature. To have been able to avoid dissipating a large part of our efforts on machines of this type, and to have been able to start designing for five years ahead will give us our reward later on. We may then be more grateful to the Americans and to the B.O.A.C. orders than we are now.

★ ★ ★

ANOTHER suggestion that was made in these letters was that the current American light aircraft market was grossly over-extended, and that a cut-back in production was inevitable. Rather surprisingly this seems to be happening already and to an extent that cannot altogether be attributed to the expected seasonal slowing-down of orders. Ercoupes, Taylorcraft, Globe, Culver and others appear to be in varying conditions of reorganization—anyhow, as far as their production schedules go—and there is every indication that other manufacturers will follow suit. This is more particularly applicable to the smaller types, for the demand for the four-seater, 150-m.p.h.-cruising, 500-mile-range aircraft remains. But prices are steadily going up, and will continue to do so.

The non-schedule operators are also finding the going increasingly tough, and many of them have not been, and will not be, able to weather the economic and seasonal storms of this winter. The Government, however, is proposing to let up on some of the rather stringent non-schedule-operator regulations insofar as air freight is concerned. This will give an additional fillip to this class of business and will go even further to improve the cargo-carrying situation.

The writer is quite certain that freight operation, and the building of special aircraft for such work, will be two vitally important and profitable branches of the industry. The present thought that a freighter can be large and tough and slow, and designed to operate from poor aerodromes, is only one small part of the programme. Long-distance, high-speed, aerodynamically advanced aircraft, with specialized interiors, will be needed and needed badly. Those who build them first will reap the benefit on a world-wide scale.

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BY the time these words appear in print the December 9th issue of *Life* should be in the hands of British readers, but for those who do not see it and who require some light relief we would recommend an article which contains some magnificent photographs, and some not-so-magnificent descriptive matter, dealing with a U.S.A.A.F. P.80 Squadron.

In it the Gloster Meteor gets an honourable mention as being "a trifle faster" than the P.80, but that isn't the only reason why it should be read. There is an article, said to have been written by a Lieutenant of the U.S.A.A.F. First Fighter Group which may or may not have had professional inspiration, but which (and I quote) ". . . describes the brutal speed of the P.80." My own guess is that, even in an industry which is only too frequently subjected to overstatement, this is probably one of the most monumental line-shoots ever printed in connection with aviation. The supporters of the kind of "there I was, upside-down, in cloud and nothing on the clock" stories had better go out of business, and for the benefit of anybody who can't get a copy, the following are the last, and most horrifying paragraphs describing the Lieutenant's sensations:

"But something starts nibbling at the controls and you flip a switch. Big, doorlike wingflaps extend into the wind stream, slowing you safely with their drag. You whisk down into the heavier air of 10,000 feet. There you can test the P.80's manœuvrability and your own guts.

"A steep, grinding turn punches you in the stomach as the abdominal bladder of the G. suit inflates. Its laces tighten around your legs and keep all the blood from flowing into your feet. Your head snaps down against your chest. The centrifugal force of the 500-m.p.h. turn increases your weight tenfold and despite the G-suit you hover on the brink of blackout. You hold your breath and contract your stomach muscles to combat it. You breathe in short, deep gasps. You straighten the plane out, relax a moment and then try again.

"This time a series of loops and whipping barrel rolls brings surging waves of irresistible forces down upon your body. As the weight of gravity changes and increases abruptly, a hot flame flares up in your chest. Your hands work at the controls feverishly but subconsciously, your concentration focuses acutely like sunlight through a lens and an amazing genius is instilled into your flying. But you are oblivious to all this. You know only the breath-sucking

things you are making this plane perform. Finally, you level out, the blood stops pounding, your breathing becomes regular. With dive brakes down, you drop swiftly to the runway. A cluster of colored lights dot the cockpit telling you in their code how well the plane is responding. Pulling into one last, steep turn, with power shut off, you slow the plane. Then, dropping the wheels and flaps, you coast to a stop and roll off the runway. No matter how many times you have done this before, your legs feel like weak rubber as you walk away from the P.80."

Personally, it makes me feel like weak rubber, too. If one assumes that the temperature at 10,000 feet was 5C (which is reasonable for California), a quick, and not fully corrected calculation suggests that 500 m.p.h. indicated at that height is about 590 m.p.h. true, and anyone who can complete a 10.G turn at that speed and still have a P.80 from which to walk away is fully entitled to all the breath-sucking he can manage!

Seriously, however, this sort of superman sensationalism in any country doesn't do any good and could, with advantages be left to the strip-cartoons. It gives the public an entirely wrong idea of aviation, and does every branch of flying a great deal of harm. It is most unfortunate that these sort of articles should appear in widely read magazines, and it is high time that the Press everywhere tried to treat aviation as what it is, not what a few neurotics think it should be.

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AS a matter of fact there may be more to this article than meets the eye. The U.S. Air Corps has, of late, been showing increased restlessness over British remarks that the States were two years behind on jet development. These claims received a good deal of publicity in the American Press, and as a result several prominent members of the aircraft industry here made it plain that they considered we were unduly optimistic and that our statements should be treated as long-range forecasts which it would take many years to fulfil. The article in *Life* is probably part of a campaign to put the P.80, and the American-built jet, back into the esteem of the American public. All of which is, after all, quite a reasonable and understandable thing to do.

If such reactions appear to us to be over-sensitive, remember that national pride runs as strongly over here as it does in England, and we shouldn't like it very much if the Americans rubbed in some of our own inferiorities in aeronautics. As a matter of fact we don't show up too well in certain directions ourselves at the moment.

★ ★ ★

[While appreciating to the full "Kibitzer's" feelings about the P.80 flying experience "blurb," we think the logic is at fault in one part of his comments. Surely 10.G is the total loading on the aircraft, and if the pilot and airframe will stand it the actual speed figure is unimportant unless the air happens to be rough and gust loadings are added. Whether the P.80 would fly, or stay together, at the Mach number represented by 590 m.p.h. true at 10,000 ft is another matter. We like the bit about "something starts nibbling at the controls . . . ."—our old friend Dr. Mach again?—ED.]

Detecting Ground Resonance

GROUND resonance has been responsible for a number of serious accidents to helicopters during experimental stages in America, and a special committee of the S.A.E. felt that the detecting of ground resonance in its incipient stages would save the industry time and money. A method of testing ground resonance for helicopters is, therefore, described in Aeronautical Information Report, No. 12.

Ground resonance, says the report, is a phenomenon arising from vibrations in the rotor's plane of rotation caused by sudden displacement of the rotor when a landing gear component touches the ground. Augmented because of resonance with other aircraft elements, these vibrations can result in serious structural damage.

It may occur during take-off, hovering, landing, or even while the rotor of a grounded aircraft is turning. Cases are known where the amplitude of vibration has built up during a pre-flight run-up to the point where the machine was overturned by its own energy.

In analyzing ground resonance, helicopter engineers find it to be a coupling of periodic rotor-blade forces (a function of r.p.m.) with other natural frequencies of the aircraft. Periodic forces applied at the rotor hub in the plane of rotor rotation are believed to vary with geometry and mass distribution of the blade system. Major sources of these forces apparently are :

(1) Critical shaft speeds (whirling) caused by mass unbalance of the rotating system, a type commonly associated with critical speeds in shafting.

(2) Blade motion about the drag hinge axis that seems to arise from blade motions in the plane of rotation creating serious self-excited vibrations.

(3) Miscellaneous unbalances from other sources in the rotor creating unbalanced centrifugal forces.

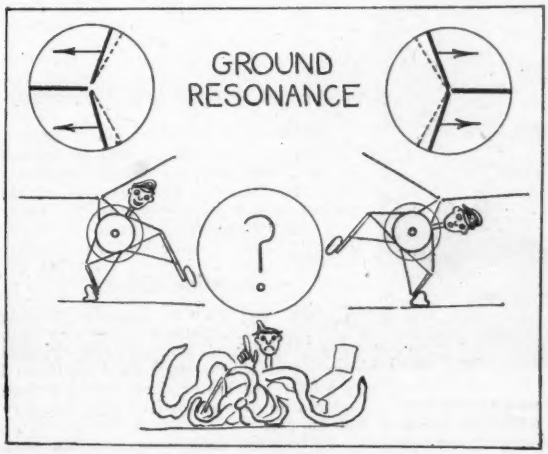
The Committee is satisfied the tests it developed for experimental machines using simple equipment will predict occurrence of critical ground resonance.

Recommended in the report is a complete survey of natural frequencies prior to the test for periodic blade forces. Items such as landing gear, rotor systems and pylon systems should be examined individually. Natural frequencies of these components can usually be determined by external excitation.

Periodic blade forces, the second ground resonance factor, is detected and kept under control by a tie-down test during initial engine run-up. The tie-down rig itself consists of a rigid framework surrounding the aircraft, or a cable system from the pylon to ground tie-down points. Provision should also be made for external excitation of the rotor hub, or pylon during rotation.

The test itself consists of starting at the lowest increment of rotor speed and violently displacing the hub in the rotor plane to induce forced vibrations. Damping response and the amount of force to produce a given hub displacement should be observed. If all goes well, this should be repeated for several increments of rotor r.p.m. A resonant condition will become apparent either by a longer damping response period or by a noticeable reduction in the force required to displace the pylon.

Tests should be started in low pitch, gradually increasing to high pitch with each increment of speed. This permits rapid pitch reduction should trouble develop.



From a lecture by R. G. Robertson, B.A., before *Aerotech*.

FORTHCOMING EVENTS

Jan. 9th.—"Aerotech" Flying Club No. 1; "Naval Aviation," R. G. Worcester.

Jan. 10th.—I.Mech.E.; "F2 Development and Shock Wave Investigation at Metro-Vick," Dr. Smith and K. Todd.

Jan. 10th.—R.Ae.S. Glos. and Cheltenham; "Liquid Springing," R. H. Bound. (Dowty Works, 7.30 p.m.)

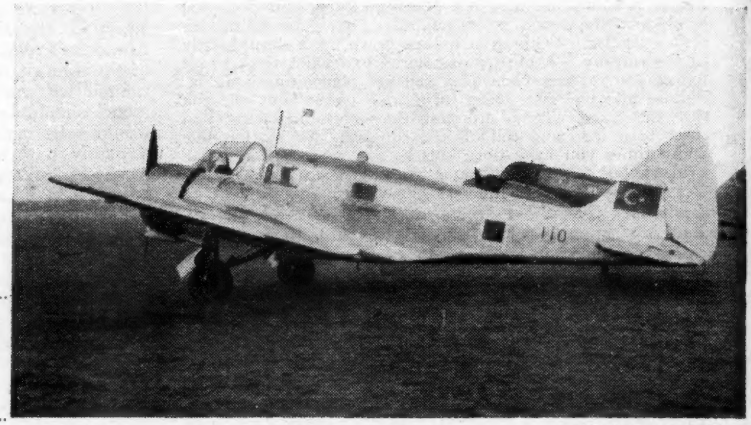
Jan. 16th.—R.Ae.S.London; "In Occupied Japan" (films), William Courtenay.

Jan. 17th.—I.Mech.E.; "Recent Developments in Flying Boats," H. Knowler.

Jan. 23rd.—Scottish Eng. Students Assoc.; "Carburation of I.C. Engines with Special Reference to Aero Engines," J. Legget. (Inst. of Engineers and Shipbuilders, Glasgow, 7.15 p.m.)

Jan. 24th.—R.Ae.S. Belfast; Smoking Concert.

HERE AND THERE



FOR TURKISH DELIGHT: One of a number of training Oxfords now being supplied to the Turkish Air Force by Airspeeds.

"Flight" photograph.

Fore!

THE Aircraft Golfing Society (not to be confused with the Aero Golfing Society) is holding its first annual dance on Friday, January 24th, at the Brent Bridge Hotel, Hendon, N.W.4, starting at 7 p.m. Tickets at 10s 6d are obtainable from the hon. sec., Mr. B. D. Songhurst, 122a, Kenton Road, Kenton, Harrow, Middlesex.

The King's Vikings

BROOKLYN AIR STATION, near Cape Town, will be the base for the King's Flight during the Royal tour of South Africa, and His Majesty's four Vickers Vikings are expected there late this month or early in February, in preparation for the event.

Two of the Vikings are to ferry out 28 officers and men of the maintenance staff almost any day now, but they will return to England, for the final outward flight under the command of Air Comdre. E. H. Fielden, Captain of the King's Flight, when the rest of the maintenance staff will be taken to the South African base.

"Out of Evil . . ."

AS a memorial to "Those who escaped but did not return," ex-R.A.F. prisoners from the notorious Stalag Luft III have raised over £450 for the R.A.F. Benevolent Fund. (Fifty R.A.F. officers were shot escaping from this camp in March, 1944).

In 1944 the prisoners produced a weekly camp newspaper called *Scangriff* ("Scandal-sheet"), and decided, when they were repatriated, to produce a more permanent record of their experiences. The work was started under F/L. Mark S. Winston, who was shot down over Rostock on Hitler's birthday, 1943, and is now a probation officer at Halifax.

During the march from Silesia the manuscript was carried in a mess tin and flown to England on VE-Day. Last autumn the book was privately printed under the title "Spotlight on Stalag Luft III," and profits amounting to over £450 have now gone to the R.A.F. Benevolent Fund.

Taxi!

"TIM" SIMS, the captain of the Bristol Freighter touring the Americas, has a kind heart which has recently earned him some advantageous publicity.

The story goes that having arrived at Oaklans airport, where the Freighter was parked, from San Francisco with his crew in a taxi, he learnt that the taxi driver, Mr. Earl Plessman, would have to make the return journey with an empty cab. This seemed rather tough, so "Tim" promptly loaded up cab and driver and flew them both back to San Francisco.

It happened to be Mr. Plessman's birthday and he described the gesture as "a swell birthday present," particularly as it saved him 35 cents in bridge toll, not to mention a gallon or two of "gas."

The Late Miss Lyon

THE death was announced last month of Miss Hilda Margaret Lyon, of Farnham, Surrey, who had the distinction of being one of the first women to become an Associate Fellow of the R.Ae.S. and, in 1930, the first woman to be awarded a prize by the Society. This was the R.38 Memorial Prize, presented annually, which she won with a paper on "The Strength of Transverse Frames in Rigid Airships."

Much of Miss Lyon's earlier work was, in fact, connected with airships, and for a number of years she was on the technical staff at Cardington. More recently, however, she was engaged in research work at the R.A.E. at Farnborough. She was 50.

P.T. with R.A.F.

AN indication that the Air Ministry is beginning to implement its oft-repeated good intentions towards the Air Training Corps, and to encourage its cadets by providing better facilities and a closer liaison with the R.A.F., was provided last week when some 70 cadets drawn from A.T.C. squadrons all over the country were given a three-day physical training course at the R.A.F. Station at Cosford, near Wolverhampton.

The brief syllabus included boxing, fencing and football as well as lectures on P.T. and general health, while the fact that Cosford Station (one of the largest of our pre-war permanent training establishments) boasts a roller-skating rink, was an added attraction.

A Wide Choice

SOME 200 surplus aircraft, ranging from a Moth Minor, a Leopard Moth and a Cygnet to 17 Halifaxes, a round dozen Warwicks, six Lancastrians, and a solitary Liberator, have recently been offered for sale by tender by the Ministry of Supply.

In between these extremes came such types as Proctors, Magisters and

SNOWMOBILE: This picture of a Norwegian model of an airscrew-driven saloon sledge, quite popular in the U.S. and Canada, was sent to *Flight* as a Christmas card by Mr. A. G. Brownsill, of Norwegian Airlines, from Oslo. He formerly served with Coastal Command and B.O.A.C.

HERE AND THERE

Dominies in fairly generous numbers, quite a few Master IIs and Martinets, some Austers and Tiger Moths, and even two or three Walrus and Sea Otters.

An equally wide range of engines and quantities of spares were also offered.

It is to be hoped that potential buyers read the conditions of purchase carefully!

Mr. Hillier Honoured

PROMINENT among the country's leading business men whose names appear in the New Year Honours list, is that of Mr. Arthur Hillier, chairman and managing director of the Sperry Gyroscope Co., Ltd.

Mr. Hillier, who receives the O.B.E., succeeded the late Marquis of Milford-haven as chairman of the company in 1938 and has been managing director since 1933. He is a Freeman of the City of London and a Liveryman of the Worshipful Company of Needleworkers.

Waiting List

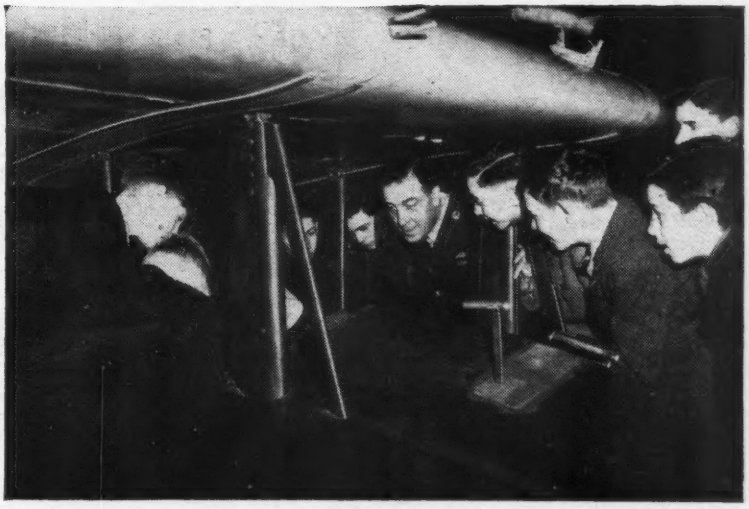
ACCORDING to Mr. A. W. Coles, chairman of the National Airlines Commission, when he attended the South Pacific Air Transport Council in Canberra last month, there are 3,000 passengers waiting to fly from Australia to America. The proving flights by A.N.A., he said, were expected to be satisfactory.

Mr. Coles left Australia for America on December 22nd, with Lester Brain, A.F.C., general manager of the N.A.C., to conclude the purchase of five Convair 240 airliners.

Gas Turbine Interest

THE Gas Turbine Exhibition at Charing Cross Underground Station came to a close last week. Arranged by the Ministry of Supply, the display made a popular appeal, the Ministry's representative, Mr. Whiting, informing us that 400 people an hour walked through.

Some of the exhibited illustrations and notes were based upon *Flight* material.



AIR CURRENT AFFAIRS. Sqn. Ldr. E. J. Furlong, D.F.C., explaining the controls of a Falcon III two-seater sailplane to a youthful audience at Woolwich Polytechnic where he gave a talk at the invitation of the L.C.C. during the Christmas holiday.

News in Brief

A MEMORIAL service to the late Mr. H. A. Bowker, joint governing director of Pytram, Ltd., was held on January 1st at St. John's Church, Farnham Common, and his ashes were afterwards interred in the Garden of Remembrance, Stoke Poges. Mr. Bowker who was 50, died on December 26th after an operation.

* * *

Father Christmas arrived at Woodford airfield in an Avro XIX (complete with sacks of toys) when 700 children of Avro employees were entertained there on December 21st. The party was organized by the Woodford committee of the Avro Institute.

An order for 100 sets of landing gear for the production series of the Dutch Fokker Aircraft Company's first post-war civil airliner, the Promoter, has been received by Dowty Equipment, Ltd.

* * *

New equipment planned by Percival Aircraft include a wind tunnel, test laboratories and a lofting floor. This was announced at the firm's annual dinner recently held at Luton.

* * *

Mr. William Sinclair, who has the reputation of being one of Scotland's best public speakers, is the director in charge of the various sales organizations of the new Dunlop company north of the Tweed which began operations on New Year's Day. He joined the Fort Dunlop staff after the 1914-18 war and became the Scottish regional manager in 1935.

* * *

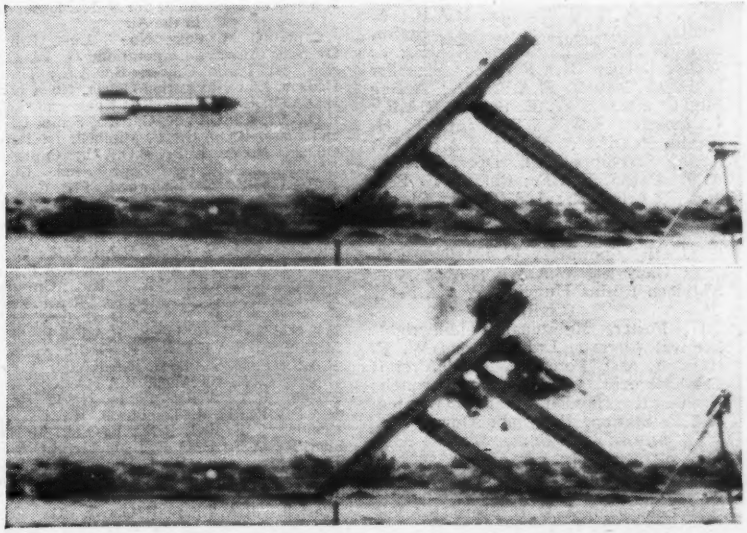
The death is announced of Mr. L. G. Rogers, head of Cook's air travel department, after 27 years' service with this concern. He had spent some time at Continental branches, but most of his service was at headquarters and he was appointed head of the air travel department a year ago.

* * *

Mr. H. F. Higgins, whose resignation from the post of general manager to R. K. Dundas (Eastern), Ltd., Bombay, was announced in *Flight*, November 14th last, has been appointed managing director of H. F. Higgins (Eastern), Ltd., Bombay, a company recently floated with Indian capital.

* * *

R.A.F. units at Malta and Gibraltar were visited last week by Mr. P. Noel-Baker, Secretary for Air. Mr. Geoffrey de Freitas, Parliamentary Under-Secretary, who visited the R.A.F. in Germany before Christmas, is to make an extended tour of Commands in the Mediterranean, Middle East, India, and the Far East, including Japan, during the present month.



TINY TIM'S PARTY TRICK: Launched for demonstration from 1,500 ft. rails, "Tiny Tim," a recent U.S. Navy R.P. for aircraft use, deals with 3-inch armour. Timothy is a sturdy infant, 10 ft. 3 in. tall, nearly a foot in girth and weighing 1,284 lb.

New Year Honours

Meteor Designer Decorated : Many Service Awards

BARON

George Morgan Garro-Jones, M.P. for South Hackney, 1924-29, and for Aberdeen, 1935-45, Parliamentary Sec. Ministry of Production, 1942-45, for political and public services.

KNIGHTS

Harold Leslie Kenward, Dunlop Rubber Co. For services to the Ministry of Supply in connection with the rubber tyre industry.

Arthur Stanley Rogers, Chairman of the British Insurance Assn., Gen. Man. and Director, London and Lancashire Insurance Co., Ltd., Vice-Chairman of British Aviation Services.

ORDER OF THE BATH

ROYAL AIR FORCE

K.C.B. (Military)

Air Vice-Marshal Alfred Conrad Collier, R.A.F. (Rtd.).

Air Vice-Marshal Douglas Harries, R.A.F. (Retd.).

K.C.B. (Civil)

Col. Percy Reginald Owen Abel Simner, Chairman, Territorial Army and Air Force Association of the County of London.

W. G. Carter, Chief Designer of Glosters—C.B.E.

C.B. (Military)

Air Vice-Marshal T. E. Drowley, R.A.F.; A.V-M. L. F. Pendred, R.A.F.; Air Comdre. C. W. Busk, R.A.F.; Air Comdre. W. E. Staton, R.A.F.; Air Comdre. F. Whittle, R.A.F.; Air Comdre. G. B. Beardsworth, R.A.F.; Grp. Capt. R. J. Rodwell, R.A.F.

ORDER OF THE BRITISH EMPIRE

ROYAL AIR FORCE

K.B.E. (Military)

Air Vice-Marshal Charles Warburton Meredith, S. Rhodesian A.F.

C.B.E. (Military)

Air Comdre. E. J. D. Townesend, R.A.F. (Retd.); Air Comdre. H. O. Clarke, F.R.C.S., R.A.F.V.R.; Grp. Capt. E. A. Beaulah, R.A.F.O.; Grp. Capt. J. B. F. Hawkins, R.A.F.O.; Grp. Capt. L. J. Schoon, S.R.A.F.

O.B.E. (Military)

Wing Cdr. J. F. Hall, R.A.F.; Wing Cdr. E. L. G. Le Dieu, R.A.F.; Wing Cdr. D. Mclaren, R.A.F.; Wing Cdr. B. F. Moore, R.A.F.V.R.; Wing Cdr F. W. Moxham, R.A.F.; Wing Cdr. C. W. K. Nicholls, R.A.F.; Wing Cdr. J. K. Rotherham, R.A.F.; Wing Cdr. N. F. Simpson, R.A.F.; Wing Cdr. W. R. A. Matheson, R.A.F.; Wing Cdr. W. W. Watson, R.A.F.; Sqn. Ldr. R. A. Moorehead, R.A.F.V.R.

C.B.E. (Civil)

W. G. Carter, Chief Designer, Gloster Aircraft Co.; Grahame Temple Meller, Administration Director, British Overseas Airways Corporation.

O.B.E. (Civil)

H. P. Grabaskey, Asst. Director of Manning (Statistics), Air Ministry; J. Green, Gen. Works Manager, A. V. Roe and Co.; A. Hillier, Chairman and Managing Director, Sperry Gyroscope Co.; S. L. Hulme, Dept, Dir. of Telecommunications, Ministry of Civil Aviation; H. J. Hutter, Asst. Dir. (Accounts), Air Ministry; J. W. G. James, Chief Pilot, British European Airways Corporation.

M.B.E. (Military)

Acting Squadron Leaders H. J. Carter, R.A.F.V.R.; W. C. Johnson, R.A.F.V.R.; F. E. Jones, R.A.F.V.R.; J. Mochrie, R.A.F.; F. H. Taylor, S.R.A.F.; J. P. Ward, R.A.F.V.R.; Flt. Lt. R. Brown, R.A.F.; Acting Flight Lieutenants E. A. Brace, R.A.F.V.R.; F. E. Murphy, R.A.F.; F/O. G. H. King, R.A.F.; Warrant Officers W. J. Ainger, R.A.F.; F. G. Ireland, R.A.F.; V. S. Peel, R.A.F.; D. B. Rushmore, R.A.F.; A. R. Springham, R.A.F.; Actg. W/O. P. Frettsome, R.A.F.

M.B.E. (Civil)

G. R. Hawtin, Station Superintendent, British Overseas Airways Corporation; Sqn. Ldr. B. C. J. Rickard, R.A.F.V.R., Commanding Officer, Plymouth Wing, A.T.C.; M. Tomlinson, Member of Committee, Nos. 1036 and 1969 (Bury) Sqn., A.T.C.; C. Tull, Civil Assistant and Accountant, Grade I, Air Ministry; J. A. Weekly, Senior Staff Officer, Ministry of Civil Aviation.

BRITISH EMPIRE MEDAL

(Military)

Actg. Chief Air Artificer W. A. Booth; Air Artificer 3rd Class E. R. Cornwell; Flight Sergeants G. H. Adams, R.A.F.; S. Ashley, R.A.F.V.R.; C. T. Bulman, A.A.F.; A. R. B. Cousins, R.A.F.; A. Smart, R.A.F.V.R.; L. A. Smith, R.A.F.V.R.; C. E. Stearn, R.A.F.; L. Wolstenholme, R.A.F.V.R.; Signaller I. F. C. Mayoh, R.A.F.V.R.; Acting Flight Sergeants W. E. Sword, R.A.F.; J. Jackson, A.A.F.; Sergeants T. H. Kneen, R.A.F.; A. T. Pitt, R.A.F.V.R.; Acting Sergeants T. L. Dyer, R.A.F.; A. R. Paton, R.A.F.; Cpl. C. F. Bennett, R.A.F.V.R.; L.A/C. K. Rhead, R.A.F.V.R.; Flg. Sgt. Catherine Mary Rumsey, W.A.A.F.; Sgt. Margaret Elizabeth Spowart, W.A.A.F.; Cpl. Joan Gamwell, W.A.A.F.; Actg. Cpl. Kathleen Rosina Huggins, W.A.A.F.

(Civil)

G. Foster, Maintenance Millwright, Percival Aircraft, Ltd., Luton; W. E. Harman, Asst. Foreman, Royal Aircraft Establishment, South Farnborough; A. D. R. Hayden, Station Warden, R.A.F. Station, Boscombe Down.

ROYAL AIR FORCE AWARDS

BAR TO AIR FORCE CROSS

Squadron Leader C. V. Haines, R.A.F.

AIR FORCE CROSS

Air Commodore A. C. H. Sharp, R.A.F.

Group Captain J. A. McDonald, R.A.F.

Wing Commanders.—E. E. M. Angell, R.A.F.; M. P. C. Corkery, R.A.F.; M. H. de L Everest, R.A.F.O.; W. H. Ingle, R.A.F.; P. M. D. Bell, R.A.F.; S. W. R. Hughes, R.A.F.

Squadron Leaders.—K. Bell, R.A.F.O.; H. H. S. Brown, R.A.F.; A. J. L. Craig, R.A.F.; R. J. Foster, R.A.F.V.R.; E. A. Johnson, R.A.F.V.R.; N. M. Maynard, R.A.F.; J. Rush, R.A.F.V.R.; K. J. Sewell, R.A.F.; E. J. Spencer, R.A.F.

Flight Lieutenants.—C. T. Boxall, R.A.F.; R. W. Bunyan, R.A.F.V.R.; K. P. H. Cleife, R.A.F.V.R.; J. A. M. Cocheme, R.A.F.V.R.; A. L. Cole, R.A.F.V.R.; R. L. Duncan, R.A.F.; J. S. Fifield, R.A.F.V.R.; G. C. Lamb, R.A.F.V.R.; W. N. MacGillivray, R.A.F.V.R.; A. C. L. Munns, R.A.F.; H. T. Murley, R.A.F.V.R.; C. Oettinger, R.A.F.V.R.; S. R. Roberts, R.A.F.V.R.; P. A. Rowell, R.A.F.V.R.; P. D. Thorne, R.A.F.V.R.; G. R. Tozer, R.A.F.V.R.; M. Tuck, R.A.F.V.R.; J. D. W. Willis, R.A.F.

Flying Officers.—R. C. Cooledge, R.A.F.; P. F. Griffiths, R.A.F.V.R.; J. G. Robson, R.A.F.V.R.; P. H. S. Taylor, R.A.F.V.R.

AIR FORCE MEDAL

Pilot II P. D. Bayetto, R.A.F.

ROYAL CANADIAN AIR FORCE

AIR FORCE CROSS

Squadron Leader J. F. M. Bell.

ROYAL NEW ZEALAND AIR FORCE

AIR FORCE CROSS

Squadron Leader S. Livingston.

ROYAL AUSTRALIAN AIR FORCE

AIR FORCE CROSS

Squadron Leaders.—A. B. Jay, J. W. Stone, E. H. Loneragan.

Flight Lieutenants.—R. H. Hornby, W. McCallum, R. L. Sprake.

Pilot Officers.—H. W. Bates, R. L. Stapleton.

NEW ZEALAND LIST

ORDER OF THE BRITISH EMPIRE

C.B.E. (Military)

Grp. Capt. M. F. Calder, R.N.Z.A.F., Air Force Mbr. for Personnel.

O.B.E. (Military)

Grp. Capt. T. J. Denton, R.N.Z.A.F., Director of Equipment.

AIR FORCE AWARDS

AIR FORCE CROSS

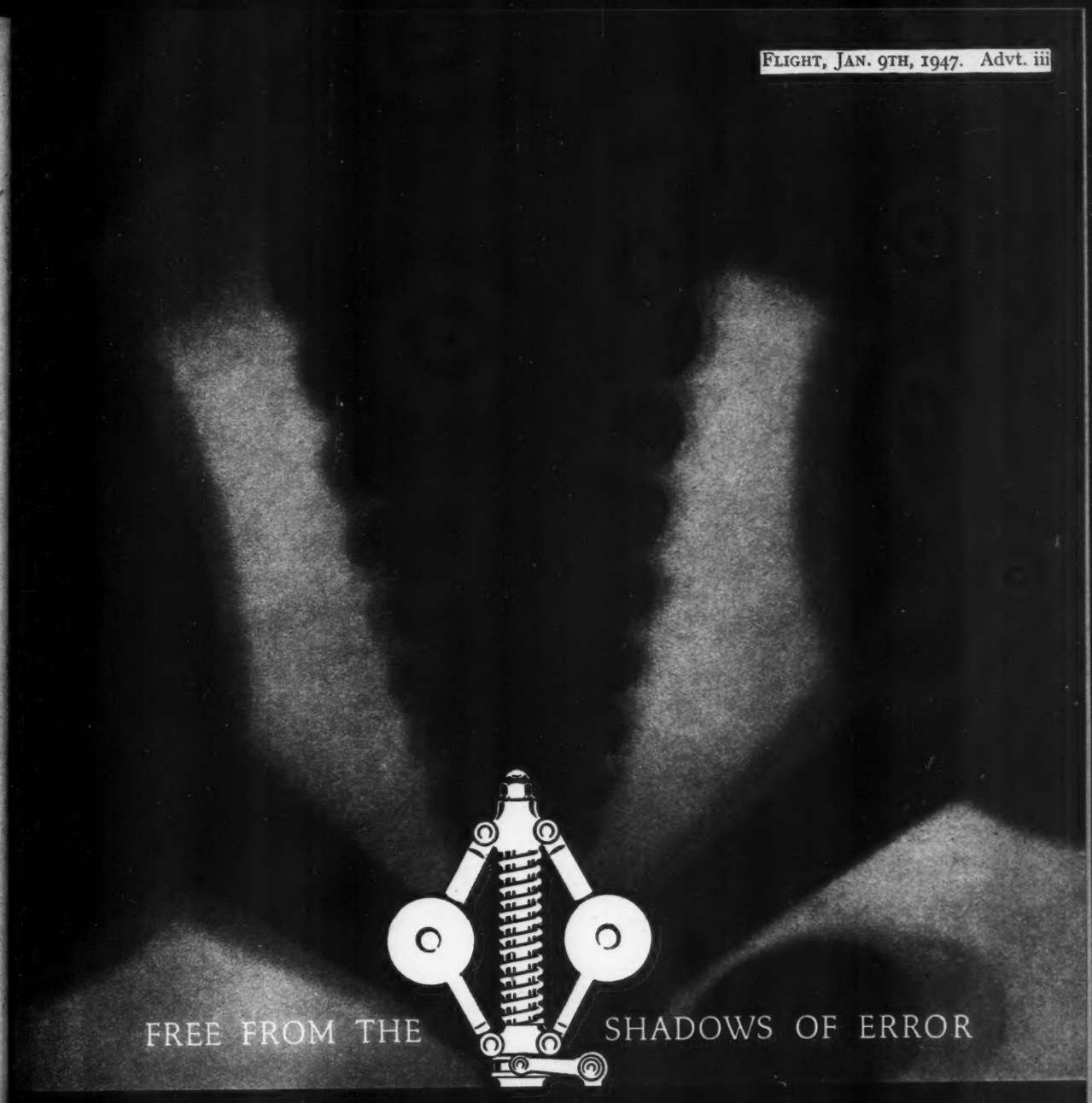
Flt. Lt. A. O. Hewitt and Sqn. Ldr. R. M. McKay, R.N.Z.A.F.

King's Commendations for Valuable Service in the Air

Capt. K. M. Cass, No. 8 Line, British Overseas Airways Corporation; G. W. Cussans, 1st Radio Officer, B.O.A.C.; D. G. Dodson, Line Navigation Officer, No. 1 Line, B.O.A.C.; E. O. Draper, 1st Engineer Officer, B.O.A.C.; Capt. F. R. Garside, Senior Capt. 2nd Class, B.O.A.C.; F. Mitchell, 1st Radio Officer, No. 2 Line, B.O.A.C.; Capt. E. Rotherham, Senior Capt. 2nd Class, B.O.A.C.; H. G. Sherwood, Flt. Comdr., Central Training School, B.O.A.C. Acting Squadron Leaders A. V. Plowright, R.A.F.V.R.; I. G. Stewart, R.A.F. Flight Lieutenants L. S. Bevis, R.A.F.V.R.; G. C. Cave, R.A.F.V.R.; W. T. Ellis, R.A.F.; P. Goswell, R.A.F.; A. K. Grayson, R.A.F.V.R.; E. L. Jacobs, R.A.F.V.R.; E. G. H. Jenner, R.A.F.; D. C. L. Kearns, R.A.F.V.R.; C. G. Lewis, R.A.F.; R. McC. Mathieson, R.A.F.V.R.; R. G. Ravenscroft, R.A.F.; P. R. Sandford, R.A.F.V.R. Flying Officers C. E. Flecknell, R.A.F.V.R.; H. S. Roake, R.A.F.V.R.; Pilots II J. Hope, R.A.F.V.R.; H. J. Tomlinson, R.A.F.. Lt. Comdr. M. F. Fell, R.N.; F/O. L. M Harmon, R.C.A.F.; F/O. E. J. Mackie, R.C.A.F.; Flight Lieutenants W. J. Hunter, R.A.A.F.; H. Lawrence, R.A.A.F.; C. Leedham, R.A.A.F.; R. Ogden, R.A.A.F.; J. R Wastell, R.A.A.F.; F/O. J. G. Earl, R.A.A.F.; Warrant Officers J. R. Brown, R.A.A.F.; R. E. Thomas, R.A.A.F.

King's Commendation for Brave Conduct

Flt. Lt. E. A. Croker, R.A.F.V.R.; Actg Cpl. R. H. Hanson, R.A.F.V.R.



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JET PROPELLED FLYING WINGS

Consideration of a Large Air Liner for High-speed Operation at Altitude

SOME day the flying wing will emerge as the accepted form of a passenger air liner. There are so many advantages in accommodating the passengers in the section of the wing and at the same time enclosing the power units to permit a clean aerodynamic structure free from protuberances, that its eventual advent seems assured. The total drag is reduced by some 33⅓ per cent. as compared with a normal type of aircraft, and new impetus is given to the problem by reason of the gradual perfection of the gas turbine of low weight operating either as a pure jet or driving airscrews. When the successful flying wing air liner appears, it will almost certainly be propelled by gas turbines.

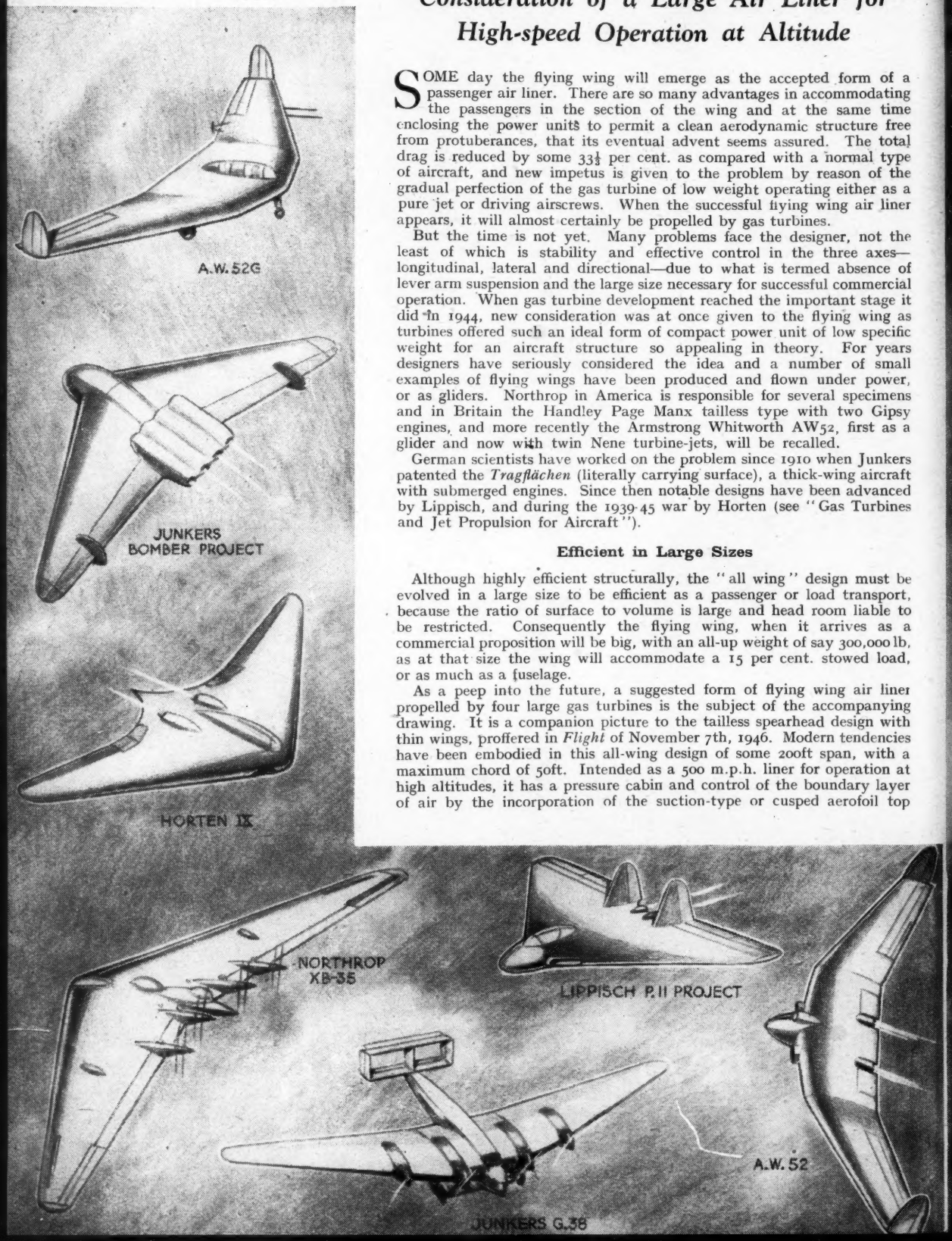
But the time is not yet. Many problems face the designer, not the least of which is stability and effective control in the three axes—longitudinal, lateral and directional—due to what is termed absence of lever arm suspension and the large size necessary for successful commercial operation. When gas turbine development reached the important stage it did in 1944, new consideration was at once given to the flying wing as turbines offered such an ideal form of compact power unit of low specific weight for an aircraft structure so appealing in theory. For years designers have seriously considered the idea and a number of small examples of flying wings have been produced and flown under power, or as gliders. Northrop in America is responsible for several specimens and in Britain the Handley Page Manx tailless type with two Gipsy engines, and more recently the Armstrong Whitworth AW52, first as a glider and now with twin Nene turbine-jets, will be recalled.

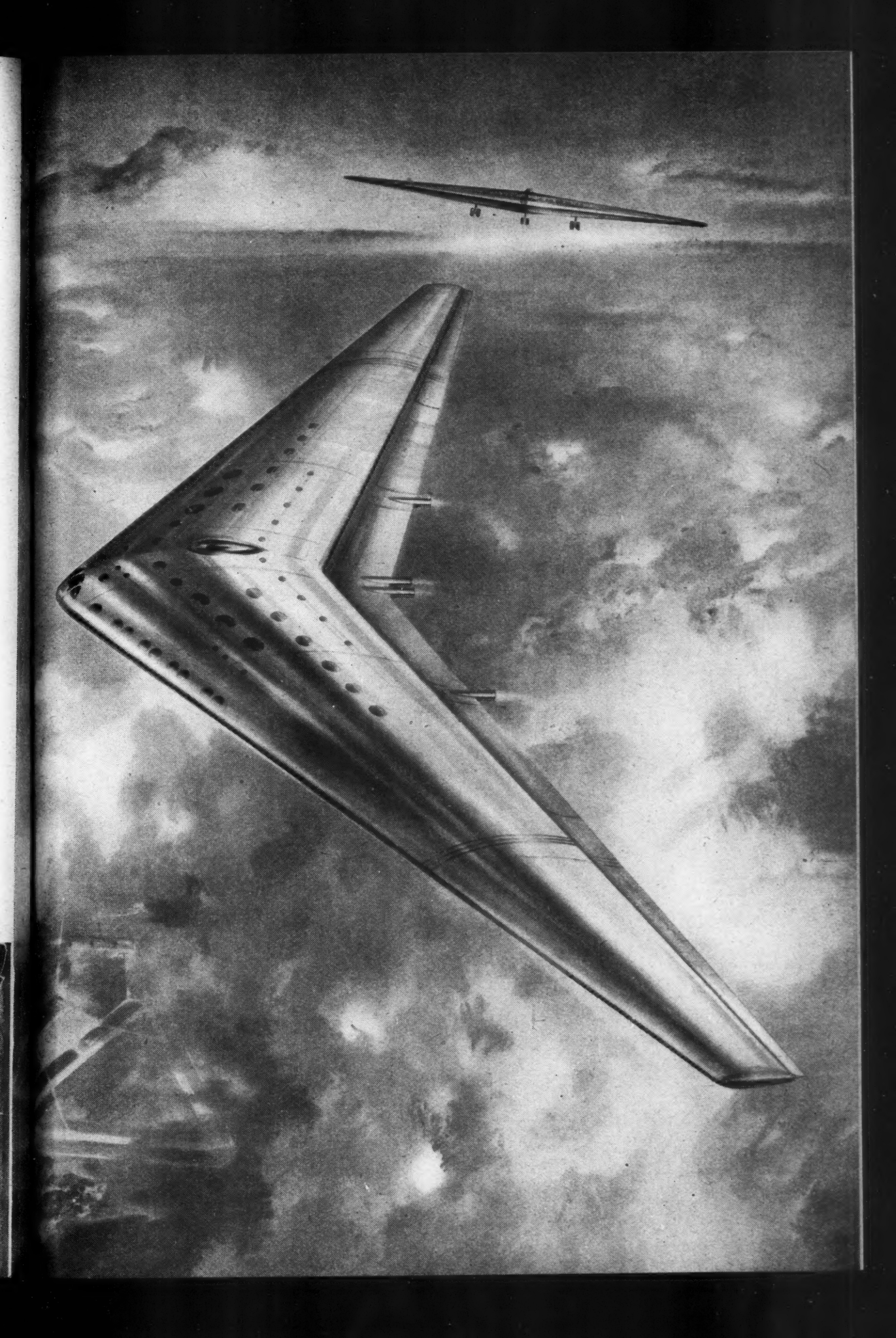
German scientists have worked on the problem since 1910 when Junkers patented the *Tragflächen* (literally carrying surface), a thick-wing aircraft with submerged engines. Since then notable designs have been advanced by Lippisch, and during the 1939-45 war by Horten (see "Gas Turbines and Jet Propulsion for Aircraft").

Efficient in Large Sizes

Although highly efficient structurally, the "all wing" design must be evolved in a large size to be efficient as a passenger or load transport, because the ratio of surface to volume is large and head room liable to be restricted. Consequently the flying wing, when it arrives as a commercial proposition will be big, with an all-up weight of say 300,000 lb, as at that size the wing will accommodate a 15 per cent. stowed load, or as much as a fuselage.

As a peep into the future, a suggested form of flying wing air liner propelled by four large gas turbines is the subject of the accompanying drawing. It is a companion picture to the tailless spearhead design with thin wings, proffered in *Flight* of November 7th, 1946. Modern tendencies have been embodied in this all-wing design of some 200ft span, with a maximum chord of 50ft. Intended as a 500 m.p.h. liner for operation at high altitudes, it has a pressure cabin and control of the boundary layer of air by the incorporation of the suction-type or cusped aerofoil top





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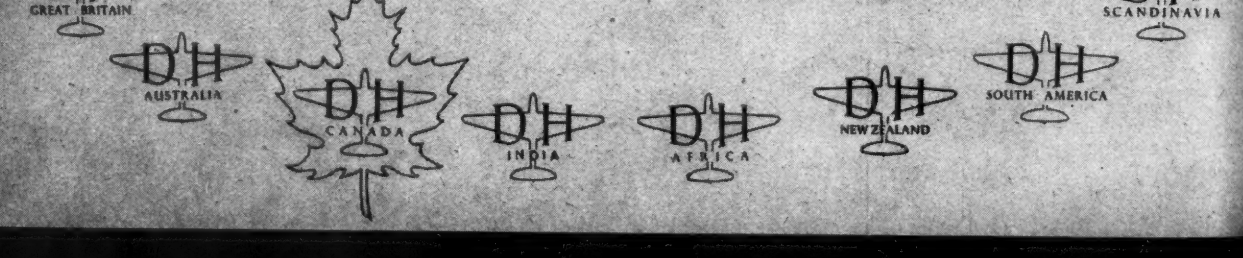

JET-PROPELLED FLYING WING

and bottom evolved by the N.P.L. in conjunction with a simple aerodynamic form.

The original idea is that of Dr. A. A. Griffith, F.R.S., who arrived at it when thinking of means of avoiding boundary layer separation in a diffuser.

As Mr. E. F. Relf explained in his recent Wilbur Wright Memorial lecture before the Royal Aeronautical Society, the fact that suction could prevent turbulent boundary layer separation has long been known, and very great increases of maximum lift have been demonstrated experimentally both here and abroad. The main problem is to design the wing shape to suit the suction.

The accompanying sketches depict representative types of "flying wing" aircraft. Although not strictly in this class the Junkers G.38 is included as it exemplifies its designer's strivings towards his ideal of the "all wing" machine. G. S.

(Readers might also like to refer back to the article "Turbines and the Flying Wing" published in our issue of May 13th, 1943.)

COLD STARTING

INFORMATION which had been gathered during 3½ years of work by a committee of the S.A.E. Aeronautics Division studying cold-starting requirements for aircraft engines was published recently. A summary appears in the Society's journal. Following concentration on six elements of the problem—cranking speed, starting power, fuel, ignition, lubrication and clearances—basic points emerge.

For satisfactory starting at sub-zero temperatures the following requirements must be met:—(1) the engine must be turned over at an adequate speed; (2) sufficient power must be available for two 30-second cranking periods; (3) a combustible mixture must be delivered to the cylinders; (4) an adequate spark must be produced; (5) the engine must receive a usable lubricant; (6) fits and clearances of mating surfaces must be such that normal functions occur irrespective of the temperature.

Additional qualifying data was as follows: The engine must be turned over at a speed greater than 20 r.p.m. and a continuous cranking type of starter gave best results. To deliver sufficient power for the two periods, batteries should be kept heated. Normal aviation petrol does not vaporize sufficiently during cold weather, high volatile priming and starting fuels are therefore necessary. Several blends of pentane, butane and propane were tested with varying degrees of success, but all tests pointed to the need for careful metering of special priming fuels to eliminate the hazards of fire and structural failure due to hydraulic lock. It was further observed that the danger of scuffing of cylinder walls through the washing off of lubricant was inherent in the improper use of special liquid starting fuels. However, such fuels proved consistently successful in starting down to −65 deg F.

The inclusion of a booster circuit in the ignition system was found to be necessary. Fouled and iced plugs were traced to false starting, and moisture condensation to inadequate fuel delivery rather than ignition malfunctions. Fouling also resulted from the incorrect use of oil dilution.

For lubrication, viscosity and "flowability" were the properties to be watched. Viscosity should be reduced by dilution with normal petrol, and the "pour point" of the oil should be lower than the starting temperature. Difficulties with clearances were overcome simply by resetting.

A final recommendation was that post-war work should aim at a suitable metering system for both liquid and gaseous special starting fuels, difficulties encountered in using high volatile fuels being directly traceable to improper fuel/air mixtures.

SWEDISH JET FIGHTER

SINCE the war, during which its entire output was absorbed by the Swedish Air Force, the Saab Company has concentrated on the development of civil aircraft, but military types are not being neglected. At present a number of J21 twin-boom fighters are being rebuilt and their Daimler-Benz 605 engines replaced by Goblin turbine jets. A top speed of about 520 m.p.h. is then attainable. This conversion, however, is only an interim step towards the Saab 1001 jet fighter, designed for a speed of 650 m.p.h.

During the war Saab fighters were made in a plant at Trollhättan, and bombers in the "rock workshops" at Linköping.

BIGGEST BOMBER

AN announcement by the Consolidated Vultee Aircraft Corporation gives some new facts concerning the XB-36 experimental bomber. With its span of 230ft and weight of 278,000 lb, the XB-36 is the largest aircraft now flying, and is claimed to have a normal range, without extra fuel tanks, of 10,000 miles with 10,000 lb of bombs. The maximum bomb load is 36 tons.

One of the most interesting facts concerns the undercarriage: the present gear, which uses 110-inch main wheels, is to be replaced by eight 56-inch wheels. The improved weight distribution, in conjunction with shorter landing runs permitted by reversible-pitch propellers, should enable the machine to operate from a greater number of airfields.

The propellers driven by 28-cylinder Pratt and Whitney engines, are claimed to be the largest yet installed. They are of Curtiss manufacture, 19 feet in diameter, and have hollow steel blades with, it is said, the first application of thermal anti-icing on production propellers.

The normal crew numbers twelve, and a four-man relief crew is carried. An 85ft magnesium tunnel connects the pressurized forward and aft crew compartments, "transportation," as the Press release puts it, being provided by a "four-wheel scooter."

It is further disclosed that the wing is of an N.A.C.A. laminar-flow section with an area of 4,772 sq ft, and that the trailing-edge carries a total power plant weight of 19½ tons. The fundamental factor which led to the selection of pusher airscrews was the desire to preserve a smooth airflow over the wing. The nacelle drag was also decreased and directional stability improved.

Largest of the 300 electric motors carried is the 22.7 lb 16 h.p. unit which drives the hydraulic system pump. Smallest is a 1/50th h.p. motor opening and closing the carburetter air filter door.

For anti-icing and defrosting, engine air, passed through exhaust gas heat exchangers, is ducted between the double skin on the wing and tail leading-edges, between the double glass of the bomb-aimer's and pilot's enclosures, and to the several sighting blisters.

RATEAU TURBO-JETS

IT is learned that the Rateau Company of France, whose turbo jet was described in *Flight* of November 28th, are working on a much larger design which is to give more than 7,700 lb static thrust for a specific consumption of the order of 0.75 lb/hr/lb thrust. Like the model A.65 or SR.A, provision is made for after-burning, and a portion of the air is to be by-passed. A thrust figure with after burning of 10,500 lb is quoted as probable for take-off with this new unit.

It will be recalled that on the A.65 approximately one-third of the main air flow is by-passed from the fourth stage of the axial compressor, and reintroduced immediately behind the two-stage turbine. From here the airstream passes over the tail cone in the jet pipe and additional fuel can be introduced from a nozzle in the cone in order to boost the power for a short period at take-off or in an emergency. Some figures quoted by the Rateau Company with regard to air dilution will be of interest.

Taking as an example a unit with a total compression of 6.25 without dilution, figures would be as follows: Specific consumption at 560 m.p.h. 1.3 lb/hr/lb thrust. Static sea-level thrust without after-burning: 1.6 times the thrust at 560 m.p.h. at 16,400 ft, and with after burning: 1.85 times the thrust. With a dilution of four, i.e., a total weight of air equal to four times that passing through the turbine, the figures would be: Specific consumption at 560 m.p.h. at 16,400 ft 1.07 lb/hr/lb thrust. Static sea-level thrust without after-burning: 2.35 times the thrust at 560 m.p.h. at 16,400ft, and with after-burning: 3.5 times the thrust.

Although a unit designed to embody a dilution system is a little heavier and more cumbersome, the saving in fuel on a flight of more than one hour's duration at full power would balance the weight increase.

Existing turbines are being started by means of an auxiliary blower feeding into the inflow channel of the compressor.

CIVIL AVIATION NEWS

Australian Developments : New B.E.A. Division : Miles Merchantman

GOOD GOING : The Gipsy Queen power plant and airscrew can be removed from the Dove, and a complete new unit fitted by two men, in just over an hour.

MISLEADING STATISTICS

Candid Comments on "Passenger-mile" Safety Criterion : Honesty as the Best Policy

THE editorial comment in *Flight* of October 31st, 1946, p. 461, referring to the article "Accident Analysis," under the Civil Aviation News heading (p. 480) appearing in the same issue, led off with the quotation "Statistics can be made to prove anything."

In this country we say—more emphatically—"There are three kinds of lies: plain lies, damn lies and statistics." This interpretation of statistics refers to such as are used in aviation to-day, when "one (or more) million passenger-miles flown per passenger-fatality" is cited as a criterion of safety. The truth of the said mileage-flown can be proven. Its implication of *safety* can also be proven —to be without any foundation.

Some analysts in the United States are keenly aware of the fallacy, and your editorial statement that "mileage is the least valuable criterion"—suggesting that some honest analysts in the United Kingdom have arrived at the same conclusion—prompts these remarks.

This article originally reached Flight *in the form of a letter from a reader in the U.S. So much false thinking is possible around and about the question of air travel safety that we felt it incumbent upon us to publish his remarks in slightly modified form. Whether or not he is being "over tough" we leave our other readers to decide, but the findings are sound and such a cold douche will do the air transport industry—both here and elsewhere—nothing but good. In the leading article to which he refers, we pointed out that accident statistics based on passenger-miles flown were largely misleading, and suggested two or three other alternatives which might provide true pictures for different aspects of air travel safety.*

Just twenty years ago, in its December, 1926, issue, p. 417, *The Scientific American* magazine carried an article entitled "Will You Travel Safely in the United States?" . . . This article was a compilation of statistics covering conventional transportation mediums, using an identical criterion of safety: "Persons carried to each fatality." The figures disclosed then that there would be carried:—

In street-railway travel,	8,422,460	persons	per	fatality
In railroad	,,	6,313,800	,,	,,	,,
In steamship	,,	5,973,436	,,	,,	,,
In aircraft	,,	24,452	,,	,,	,,

Faced with such adverse comparisons, the aviation industry, in a moment of weakness, decided not to play ball with its companion mediums of transportation, but to go on alone with a criterion of its own contriving—a criterion which, in time, could perhaps provide "the industry" a sufficiency of ciphers to fill the horrible vacuity shown above.

So the "passenger-miles flown" criterion was put to work. This is seen to be the product of the number of passengers-carried multiplied by the number of miles-flown; a process of multiplication, and distinctly different from the more rational *ratio* of passengers-killed to the number of passengers carried.

This "ratio" criterion is logical and scientific, "ratio" being "the relation of one object to another similar object." Passengers and fatalities are similar "objects," since the fatality is related to the passenger. "Miles flown" is a measure of distance and bears no relation to passengers; the objects are dissimilar and the comparison is unscientific.

But the multiplication of the number of passengers carried by the number of miles flown produces the synthetic term "passenger-miles," characterized by such a large number of "aughts" that, the industry assumes, they "ought" to make everyone comfortably confident of the safety of aircraft travel!

What sophistry! And what are the facts?

In forty-three years of development, aircraft have increased their passenger-carrying capacity and their speed; speed in turn, has increased the miles flown, thus producing the "makings" of passenger-miles in a given period of time. An aircraft carrying twenty passengers, compared with one carrying ten passengers, each flying an equal number of miles, doubles its passenger-miles capacity. Similarly, an aircraft flying twenty miles, compared with one flying ten miles, each carrying an equal number of passengers, doubles its passenger-miles capacity. Also, one flying at 200 m.p.h., compared with one flying at 100 m.p.h., each carrying an equal number of passengers, doubles its passenger-miles capacity.

So it is seen how load, distance and speed, singly and in combination, multiply the digits of the industry's self-chosen criterion of safety, while the actual safety-factor of aerial travel has not increased.

And it is apparent, now, why the industry's craze for speed has been inspired largely by the necessity to build up millions of passenger-miles flown (to sustain its false criterion-of-safety) and, by this attempt, to equal, at least

numerically, the millions of passengers carried—the legitimate criterion used by all other mediums of transportation.

But where will this digital race lead? To such astronomical figures (when supersonic speeds are finally attained), as to make the industry's pretensions the laughing-stock of the public it has duped for so many years.

Well, what then? In reprisal, the railroad, steamship and street-railway companies need only adopt the aircraft industry's pet criterion. They need only multiply the number of their passengers carried by the number of their miles travelled, to put themselves away out ahead of the aviation industry in the excess of digits they could thus display.

Face the Facts

So, after twenty years or more—spent in evading the issue—the aviation industry will find itself just where it was when it threw off its responsibilities in 1926—and with nothing gained except a bad name. This must not be allowed to happen. Instead, the industry must frankly endorse and adopt the "passengers carried per fatality" criterion of its competitors.

Automobiles kill 30,000 or more persons every year in the U.S. alone. Does this deter the manufacture or operation of automobiles? Not at all. More automobiles are made, sold and operated every year. *The Scientific American* figures show that steamship travel is very much more dangerous than street-railway travel. Does this deter people from travelling by steamship? Not at all. Steamship travel increased annually before the war.

What it all suggests is that the aviation industry need not fear publication of the fact that aerial travel is dangerous. It *is* dangerous, but it is also desirable and a necessity in many phases of modern life. It is here to stay, and nothing can prevail against its development and growth.

So I would say to the industry: Believe what Mark Twain meant when he said, "When in doubt, always tell the truth." He also said: "Be honest. This will gratify some people and astonish everyone else."

The merit of being truthful and honest about the dangers of flying and of frankly admitting its inferior position in any tabular comparison of safety is that this procedure will simultaneously expose the industry's primary *need*. This, in turn, will enlist the immediate co-operation of scientists, engineers and inventors all over the world. These co-operating forces can be depended upon to remedy defects and to create new types of aircraft which are characterized by greater factors of safety in design, construction and operation. There exists no incentive for these forces to function now, or so long as they are "propagandized" into the delusion that air travel is safe. Such propaganda is a pernicious hurdle placed across the path of progress and must be removed—in the joint interests both of the industry and of the public.

I submit the above thought as a resolution. Progress can be initiated by one mind, but it can be materialized only with the co-operation of many minds, all channelled towards the common goal. JOSEPH A. BLONDIN.

EMPTY SEATS

A REQUEST was made recently to the Parliamentary Secretary to the Ministry of Civil Aviation, to direct that Government departments should, like private passengers, pay a fine when the notice of cancellation of seats booked for their staff in outgoing aircraft was too short for those seats to be filled. Mr. Lindgren replied that the proportion of seats booked for members of Government departments was small, and as it rarely happened that they were cancelled too late to be resold, he was satisfied that the number of such cancellations would not have been reduced had a system of fines been in force.

A system of fines may ease some of the losses incurred by the operators, but the real need is a greater opportunity for filling those seats which are cancelled. The Government are at present allowed until 3 p.m. on the day before departure, before a cancellation notice is necessary. If the aircraft is due to leave early in the morning there is little hope of finding passengers in time. In addition to this, there are several services to the Continent which are run entirely for Government officials. Cancellation of seats on these services represent an immediate loss to the operator. It is surely just that such services should be run on a different basis from the normal public schedules.

A QANTAS YEAR

IN the course of the Qantas chairman's speech at the annual general meeting last month, Mr. W. Hudson Fysh made several interesting points.

The first of these was that the company had earned a net profit of £54,061 during the preceding year. He also explained the reasons why Qantas Empire Airways had purchased four Constellation 749s with the appropriate spares and equipment. During the conference at Canberra in March the details of the post-war Australia-England services were settled. It was then decided to operate for an initial period with Lancastrians and Hythes, working the route in two sections. By September last year it was expected that Phase 2 could be put into operation, in which both Qantas and B.O.A.C. would operate through from Sydney to London in co-operation. Since no suitable British aircraft were yet available, Qantas had therefore placed an order for Constellations, which would operate over 2,500-mile stages while carrying a payload of 13,200lb—including forty-four day or twenty-four night passengers. It was expected that the Constellation would complete the Sydney-London journey in an elapsed time of sixty hours, including ten hours for ground stops.

During last year an agreement was reached between the Commonwealth and the United Kingdom Governments whereby the former would acquire the B.O.A.C. holding in Qantas Empire Airways, and a bill to that effect was now in the Australian Statute Book. The Commonwealth thus became a partner of Qantas, which would be a hundred per cent Australian undertaking. Qantas would, in fact, become the accredited overseas operator for the Government. Qantas were now negotiating with the Commonwealth Government for the inauguration of a service from Sydney to the Philippines and farther north.

The entry of the Government into airline operation in Australia, and the formation of Trans-Australia Airlines had meant the loss to Q.E.A. of quite a number of its staff—chief amongst whom was Capt. Lester J. Brain, previously Q.E.A. operations manager, who had been appointed general manager of the new Government organization.

B.E.A., CARGO DIVISION

BRITISH EUROPEAN AIRWAYS are in the process of purchasing ten Dakota passenger aircraft and eight Dakota special freight aircraft. The Corporation is forming a Cargo Division in addition to the existing Continental, English and Scottish Divisions, and its function will be to fly scheduled freight services within each. The passenger aircraft are for use on the internal routes where traffic is increasing, and also as an "insurance" against the shortage of aircraft generally. The purchases have been made possible by a considerable improvement in the position with regard to Dakota spare parts.

MILES MERCHANTMAN

IN *Flight* of November 21st we gave some preliminary details of the projected Miles Merchantman freighter. This appropriately named aircraft might be described as a considerably enlarged and modified all-metal version of the Aerovan, which is already doing good work in the light freighter field.

It will be powered by four D.H. Gipsy Queen 31s, and with these will have a cruising speed of about 155 m.p.h. and a rate of climb, at maximum power, of 1,100 ft/min. The maximum still-air range will be 850 miles and the payload about 5,000 lb.

It is obviously designed for uses somewhat similar to those of the Aerovan, but with a suitably scaled-up performance and hold-volume. The span will be 65ft, and the hold actually measures 18ft × 7ft 9in and will be 6ft 6in high. As in the case of the Aerovan, the entire rear of the fuselage forms a door, and the floor will be stressed for concentrated loads. It will be of the high-wing type, with the tail unit carried on a boom.

UNITED STATES–CHINA ROUTES

MR. WILLIAM ROBERTSON, of the United States Civil Aeronautics Administration, has been responsible for negotiating an air transport agreement with China. Airlines of both countries have been granted the right of transit and non-traffic stops in the territory of the other. United States airlines will be permitted to pick up and discharge passengers,

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cargo and mail at Shanghai, Tientsin and Canton. Chinese airlines are allowed similar traffic rights at Honolulu, San Francisco and New York. The agreement has named the carriers to be made responsible for scheduled operations between the two countries as China National Aviation Corporation and the Central Air Transport Corporation for China, and for the United States North-West Airlines, Pan American Airways and Trans-World Airlines. Three routes were agreed upon, to be operated, apparently, by both the Chinese and the American companies. One is a northern route via Canada, Alaska, the Aleutians, the Kuriles, Japan and Korea. Route two is the mid-Pacific run via Hawaii, Wake, Guam and the Philippines, and the third route connects China and the United States across the Atlantic, Europe, North Africa, the Middle East, India and Burma.

B.O.A.C. IN 1946

THE highlights in the steady expansion of B.O.A.C. during 1946, the first full post-war year of civil flying, have been the developments of the Empire routes. With the formation of British European Airways in August, B.O.A.C. were relieved of the operation of the European routes, and were thus able to turn their full attention to the long-distance services to the countries of the Commonwealth and Empire, U.S.A. and the Far East.

In co-operation with Qantas the flying-boat route to Australia was reopened. The frequency of the B.O.A.C./South African Airways service to Johannesburg was increased to four a week, and is due for a further increase to six. The first British commercial services between London and Scotland to New York were, of course, opened, and are being operated regularly with Constellation aircraft. The first stage of the "Dragon" route to the Far East was inaugurated by the start of the weekly flying-boat service to Hong Kong. This will be extended to Tokio as soon as possible. A flying-boat service was also opened between Singapore and Hong Kong, via Bangkok, at a weekly frequency. The Corporation are now operating sixty-three services weekly in each direction, over a gross route distance of 122,798 statute miles.

ROCKET ASSISTANCE

AN American Overseas Airlines freight aircraft recently carried a cargo of ten tons from Mexico City to New York. The airport is 7,300 feet above sea level, which made it necessary for the aircraft, with its abnormally heavy load, to be assisted during take-off. For this the DC-4 was fitted with four "Aerojet" rockets, which were ignited when the aircraft reached a speed of about 105 m.p.h. after travelling about 1,600 yards down the runway. The propellent charge includes both the fuel and the oxygen necessary to burn it, and is contained in steel bottles about 3ft long slung under the wings of the aircraft.

CANADIAN REVIEW

MR. H. J. SYMINGTON, president of Trans-Canada Air Lines, in a review of the activities of the company during 1946, referred briefly to its history. Incorporated in April, 1937, T.C.A. reached the stage of operating a full daily service between Montreal and Vancouver two years later. During the war years, in spite of the shortage of men and materials, it expanded, linking Canadian centres with Chicago, Cleveland, Duluth and Seattle. Trans-continental flights were increased to four a day in each direction and larger aircraft were purchased. The trans-Atlantic operation began in July, 1943, as the Canadian Government Trans-Atlantic Air Service, entrusted to T.C.A. It was designed primarily for the carriage of mails to and from the Canadian Forces overseas, and for urgent delivery of medical supplies and other equipment. When the war finished it developed into a fare-paying passenger service. Within the next few months T.C.A. will assume full control under a wholly owned subsidiary company, Trans-Canada Atlantic Limited.

A decline in air-mail traffic has given the company serious concern, particularly as the new contract with the Post Office department, which became effective in April, 1946, has resulted in decreased compensation for the carrier. This contract is based on the amount of mail carried rather than, as formerly, on miles flown, so it is important that the air transport of mail should be fostered and encouraged. In the United States this has been accomplished by a reduction in the air-mail surcharge. This diminishing mail revenue was the disappointing factor of the year's operations.

T.C.A. have had to face those increasing costs which normally attend great extensions of airline services, involving, as they do, the engagement of new personnel, their training and familiarization with new types of aircraft, as well as with the opening up of new offices, airfields and communications. These difficulties were accentuated by the failure in delivery of some new equipment due to the lack of materials arising from industrial strikes.

The new services which did go into effect, however, are considered to have enhanced the airline's usefulness, and did much to stimulate social and commercial intercourse between Canada and the United States. At Vancouver the company acquired the large Boeing overhaul hangar, and began the establishment of a major maintenance base to serve not only the trans-continental but also the trans-Pacific routes. At Montreal T.C.A. continued to maintain the Liberator aircraft used by B.O.A.C. on the North Atlantic ferry service. Several V.H.F. radio stations have been installed which, it is hoped, will give improved air-to-ground communication. Certain instrument landing equipment has also been sited.

Dakota aircraft are now used on a large section of the trans-continental routes. These are slowly taking the place of the ten- and fourteen-seater Lockheeds which are at present in service. T.C.A. are placing a lot of faith in the new DC-4 fitted with Merlin engines. The prototype, the *North Star*, was test-flown in July, and made a flight across the continent in September, when it gave every indication of being a fast and efficient transport. The first production model was delivered in November and is at present being used for aircrew training. It is hoped that these aircraft will go into service on the trans-continental and trans-Atlantic routes in the new year, and eventually on services to the West Indies and Australia.

During December the thousandth crossing of the Atlantic was made. This service was greatly accelerated during the year, when the frequency was increased from three a week to one flight every day. The route was extended to London, although Prestwick remained the airline's servicing base in the United Kingdom. Within a few weeks it is hoped to be flying regular schedules to Bermuda and between Halifax and Boston, and in the not too far distant future surveys will be made of the trans-Pacific routes.

B.E.A. SCOTTISH MANAGER

THE British European Airways Scottish Division comes into being on February 1st, and Mr. George Nicholson, director, and manager of the Southern Sector of Scottish Airways, has been appointed manager of this Division. Mr. Nicholson has been associated with civil aviation in Scotland since 1934, when he formed Northern and Scottish Airways. This company later merged with Highland Airways and became known as Scottish Airways. Capt. E. E. Fresson has been appointed North of Scotland area manager, and Mr. William Cumming the senior executive officer of the Division. Capt. Fresson was responsible for the formation of Highland Airways, of which he was managing director, until the company amalgamated with Northern and Scottish Airways. Since then he has been a director of Scottish Airways and manager of the Northern Sector. Mr. Cumming, a chartered accountant, has been secretary and chief accountant to Scottish Airways since its inception.

THE SHANNON CRASH

THE cause of the accident to a T.W.A Constellation in Ireland on December 28th is still unknown. A complete investigation is being made by the Department of Industry and Commerce, Eire, the American Civil Aeronautics Administration, and the Regional Accident Board of T.W.A.

The captain and co-pilot, although seriously injured, have, however, been able to make short statements. From the scanty evidence it is believed that up to the time of the accident the entire circuit and approach had been normal in every respect, and there had been no failure in any part of the aircraft or in any of the engines. The nature of the wreckage indicates that the aircraft travelled a considerable distance along the ground before fire occurred. There was certainly no fire or explosion during flight. The aircraft had made a routine flight from Paris, and was making its final turn on to the approach for a landing at Shannon, when the accident occurred.

AUSTRALIAN AIRPORTS

THE Prime Minister of Australia recently announced the Government's policy on airports. In future, all airports at capital cities, those necessary for the operation of international air services, and those others required as stopping places for regular domestic services, will be owned, developed, maintained and controlled by the Commonwealth Government. Those airstrips which were constructed by the Royal Australian

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Air Force during the war, but are not at present on scheduled routes, will be retained and kept in a serviceable condition by the Government if there is some prospect of including them as airfields on services which will be developed later.

BREVITIES

Air India are now operating two Dakota services a day from Bombay, one to Delhi and the other to Karachi; these are in addition to the daily schedules through Bombay, Madras, Colombo, and Bombay, Nagpur and Calcutta. The additional schedules are flown at night.

* * *

Capt. David Brice, until recently the chief pilot of British South American Airways, has now joined British Aviation Services in the capacity of operations manager to Silver City Airways. Some details of this new charter company were given in *Flight* of December 19th.

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Trans-World Airlines have cut their scheduled daily route mileage by 22 per cent. This, and the cancellation of orders for twenty-five new aircraft, has been done because the company finds itself in "as critical a position as when air-mail contracts were cancelled in 1934." The recent air-crew strike was the last of a succession of misfortunes, which included grounding of the Constellations.

* * *

The Boeing Aircraft Company have abandoned their plans for building the Type 417, a feeder-service aircraft, owing to the changed conditions and present market uncertainties in the smaller transport aircraft field. The project had reached the preliminary tooling stage only.

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British Commonwealth Pacific Airlines have applied to the American Civil Aeronautics Board for permission to fly between Australia and North America via New Caledonia, the Fiji Islands, Canton Island and Honolulu to San Francisco, and, if desired, beyond to Vancouver.

* * *

It is understood that during a recent test flight of the DC-6 a cruising speed of 317 m.p.h. was maintained at 10,000ft.

* * *

Mr. G. M. Hislop has been appointed senior assistant to the controller of research and long-term development in B.E.A.C. For the last eight months Mr. Hislop has been in charge of full-scale research on helicopters at the R.A.E.

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Leaving this country in March, a Bristol Freighter is due to start on a sales tour of Australia and New Zealand. While en route to Darwin, the aircraft will be demonstrated at various points, and for navigation through the monsoon areas a Qantas Empire Airways' crew is being provided. It is expected that the tour will last some four or five months.

* * *

600 Piper Cubs have been shipped overseas from the United States since VJ-Day. 1,512 export orders are still on hand.

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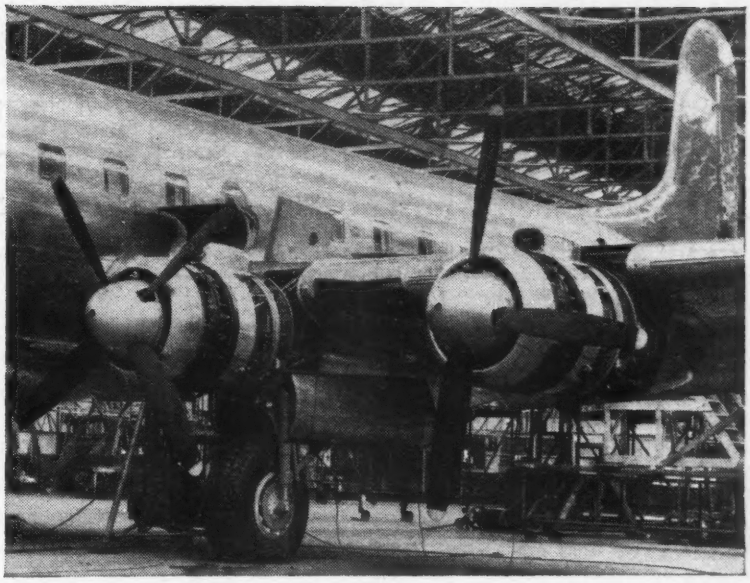
The United States and Uruguay have signed a bilateral agreement authorizing air services between the U.S. and Montevideo via the east and west coasts of South America. Pan American Airways at present operate down the east coast and Pan American Grace Airways down the west coast, and the agreement provides for reciprocal operations of a Uruguayan airline.

* * *

Skytravel, the Liverpool charter company, has recently taken delivery of a Bristol Wayfarer which will be primarily used for operations between this country and South Africa. Incidentally, Skytravel started rather peculiarly in that the managing director made a somewhat casual entry into the business. He owned an Auster and hired it out to his business associates; bookings were so numerous that he found it necessary then to buy two Proctors, and so the business gradually built up.



HERCULEAN TUDOR. The first Tudor II with radial engines. As can be seen from the photograph, the installation of the Hercules type 120 engines in this prototype is nearly completed

FROM THE CLUBS

A NUMBER of interesting flying events are now being organized by the Luton Flying Club. For instance, on January 12th there will be a navigation race in the afternoon, while on Sunday, the 19th, there will be a tea patrol, and on Sunday, the 26th, a spot-landing contest.

* * *

One of the pre-war series of Brooklands' clubs—the Northampton Aero Club—started operations again at Sywell, Northants, on the first day of the year. So far there is no clubhouse, but this, which once upon a time was one of the most attractive in the country, is being redecorated and will be ready for occupation on February 1st. The secretary is Mr. W. Parry. Meanwhile, the South Coast Flying Club at Shoreham, which has been in operation for only four months, now has 350 members. Two Tiger Moths and one Proctor are available, and the normal flying rates are £4 an hour dual and £3 15s an hour solo. The club will be holding an inaugural dinner and dance on February 14th

* * *

The Cinque Ports Flying Club has fixed August 30th and 31st as the dates for the Folkestone Aero Trophy, the Siddeley Trophy and the High-Speed Handicap races. It will be remembered that these races were an outstanding success in 1946, and it is hoped that this year's event will prove to be an even greater attraction. The club now has two Tiger Moths, an Auster and a Proctor for private flying and instruction. There are over thirty regular flying members, of which ten have either qualified for, or renewed, their "A" licences. Mrs. Attree continues to manage the club and social activities, but the flying is conducted by Hunting Flying Clubs, the chief instructor being Mr. G. H. Clarke, late of No. 25 Squadron. Mr. H. D. Rogers, his assistant, was previously instructing at Luton and Broxbourne. The old club premises were, of course, destroyed by enemy action, but a Lympne Country Club has now been opened on the edge of the airfield, where members and those arriving by air may obtain meals. It is hoped that by next summer full residential accommodation will be available. Given local support and very much better weather in 1947, there is no reason why the Cinque Ports Flying Club which, incidentally, Mr. Churchill has honoured by becoming its president, should not regain its pre-war popularity and prestige.

A.E.A.F. Operations in North-West Europe

Air Chief Marshal Sir Trafford Leigh-Mallory's Despatch

THE forces of A.E.A.F. comprised the R.A.F. 2nd Tactical Air Force, the United States Ninth Air Force, and the Forces of the Air Defence of Great Britain. The British formations passed to Leigh-Mallory's command on November 15th, 1943, but though the U.S. Ninth Air Force came under his operational command on December 15th it was not released from its commitment to assist the U.S. Strategic Air Forces in "Pointblank" operations until March 10th, 1944. ("Pointblank" was the name given to the combined bomber plan of the strategic bombing forces which aimed at the reduction of the German fighter forces and war potential and the weakening of the will of the Germans to continue their struggle.)

Air Chief Marshal Leigh-Mallory relates how, to achieve the most economical and effective employment of his forces, he established a small operational organization known as Advanced Allied Expeditionary Air Force. Air Marshal Sir Arthur Coningham, K.C.B., D.S.O., M.C., D.F.C., A.F.C., was appointed to command it. Throughout the preparatory and assault periods, control of the fighter-bombers and the light and medium bombers of the two tactical air forces was exercised through a Combined Operations Room at Uxbridge. Likewise under the direction of the Commander A.A.E.A.F., a Combined Control Centre was established and was operated by the A.O.C. No. 11 Group, R.A.F., with the collaboration of the Commanding General, U.S. IXth Fighter Command and with authoritative representation of the U.S. Army VIIIth Fighter Command. A Combined Reconnaissance Centre coordinated and directed visual and photographic reconnaissance by British and U.S. forces.

Plans

The second part of the despatch concerns policy and planning. Operation "Overlord" is described as part of a large strategic plan designed to bring about the defeat of Germany by concerted assaults on German-occupied Europe from the U.K., the Mediterranean, and Russia. Operation "Neptune" provided for the launching of an assault, across the English Channel, designed to secure a lodgment area on the Continent from which wider offensive operations could be developed.

Air Chief Marshal Leigh-Mallory was confident that the German Air Force would constitute no serious threat to land, sea and air operations, but could not dismiss the possibility that the enemy was conserving his air forces for a maximum effort against the Allied assault. A bombing plan was therefore prepared to drive the G.A.F. fighters back 130 miles to bases as far from the battle as were the Allied fighter forces. Enemy bomber bases even farther inland were also scheduled for attack. It was considered possible that an intense air battle might last for up to a week following the assault, and it was necessary to have on hand a strong enough force of fighters to ensure that the enemy would be completely mastered.

Throughout the whole of the preliminary and preparatory phases of the operation Air Chief Marshal Leigh-Mallory had to take into account the need to maintain bombing attacks on "Noball" targets. ("Noball" was the code word used to designate the sites being prepared by the enemy for attacks on England with flying bombs and rockets.) Operations against these sites, carried out under the title of "Crossbow," began as early as December 5th, 1943, and constituted a considerable diversion of bomber effort. This bombing did not in itself succeed in completely eliminating the menace of the flying bomb, but was fully justified because the original scheme had to be abandoned by the Germans. The bombing of "Noball" targets, moreover, was not wholly unprofitable, even judged from the point of view of "Neptune" alone, for medium and light bomber crews gained experience in finding and attacking small, well-concealed targets and improved bombing accuracy.

The third part of the despatch is a narrative of operations. This Air Chief Marshal Leigh-Mallory introduces by affirming that air superiority was the principal prerequisite for the successful assault of Europe from the West. He was confident that the necessary ascendancy had been gained some time before D-Day, and advised the Supreme Allied Commander to this effect. "In the event," he states, "the German Air Force was more impotent than I expected." He then sets out some of the efforts of the strategical bomber forces directed to secure air superiority during the preliminary period, throughout which the medium and light bomber forces of the A.E.A.F. were engaged in support of the strategical bomber programme and in meeting "Noball" commitments. Intelligence indicated that German aircraft production had been crippled. Further heavy blows were inflicted in attacks on airfields and in combat, and a campaign of day and night intruding was designed to hamper training schedules as well as to destroy the enemy in the air.

It became evident during the period November, 1943, to May, 1944, that the G.A.F. was conserving its air forces for the defence of vital targets. Even large-scale fighter sweeps failed to produce serious reaction. Nevertheless, from November 15th, 1943, to the eve of D-Day the Allied forces accounted, in the air alone, for 5,238 aircraft destroyed, 1,060 probably destroyed, and 2,551 damaged.

Dealing with what he calls the preparatory period, Air Chief Marshal Leigh-Mallory gives as the strength of the A.E.A.F. at April 1st, 1944, the following numbers of operationally available aircraft:—

Type	Ninth Air Force	Royal Air Force
Medium Bombers	496	70
Light Bombers	96	38
Fighters and Fighter Bombers ...	607	1,764
Transport Aircraft	865	225
Gliders	782	351
Reconnaissance Aircraft	63	156
Artillery Observation Aircraft ...	—	164
	2,909	2,768

Next to the winning of air superiority, the dislocation of the enemy's lines of communication was the most important task. There were two broad plans for doing this; one was a short-term policy involving attacks on certain rail centres during the period immediately before D-Day; the other was a longer term plan of destroying the potential of the railway system in N.W. Europe. In March, 1944, the longer term plan was accepted by the Supreme Allied Commander. By D-Day, of the eighty targets allocated (18 to A.E.A.F.; 39 to R.A.F. Bomber Command; and 23 to U.S. Eighth Air

A fifty-six page Supplement to the London Gazette is devoted to a despatch by the late Air Chief Marshal Sir Trafford Leigh-Mallory, K.C.B., D.S.O. describing air operations by the Allied Expeditionary Air Force in N.W. Europe from November 15th, 1943, to September 30th, 1944. Air Chief Marshal Leigh-Mallory was Air Commander-in-Chief of A.E.A.F. and his despatch, submitted to the Supreme Allied Commander in November 1944, is one of the most eagerly awaited of last war documents. The value of the paper is necessarily limited because of the incompleteness of Allied intelligence at the time of its compilation; thus various figures are unconfirmed estimates. This, however, does not detract from its value as a record covering ten and a half months of the most heavy and concentrated air war in history, or as an outline of the policy and planning which governed the operations.

The late Air Chief Marshal Sir Trafford Leigh-Mallory.

A.E.A.F. OPERATIONS IN NORTH-WEST EUROPE

Force), 51 were categorized as being damaged to such an extent that no further attacks were necessary until vital repairs had been effected; 25 had been very severely damaged, but with certain vital installations still intact, necessitating a further attack; and the remaining four had received little or no damage, demanding another attack on first priority. Between February 9th, 1944, to D-Day the scale of effort against railway targets was as follows:—

Force	Sorties	Bombs
A.E.A.F.	8,736	10,125 tons
R.A.F. Bomber Command ...	8,751	44,744 tons
U.S. Eighth Air Force ...	4,462	11,648 tons
	21,949	66,517 tons

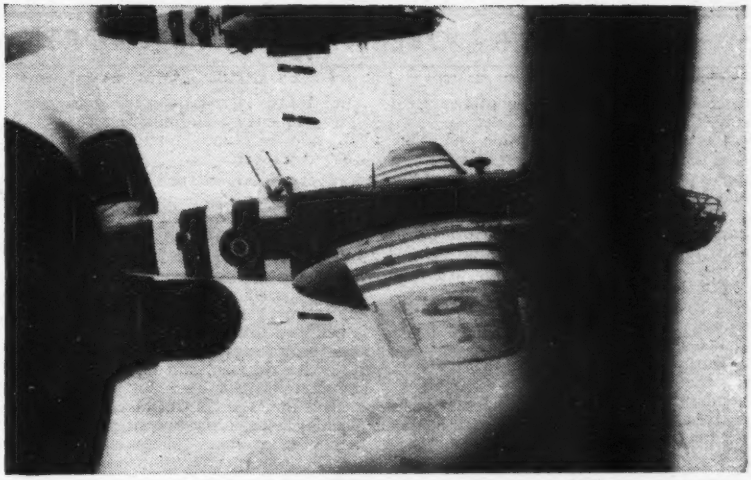
The first really heavy and damaging attack on a rail centre was that by R.A.F. Bomber Command on Trappes on the night of March 6th-7th, 1944. An immediate interpretation of photographs showed extremely heavy damage throughout the yards; 190 direct hits were scored on tracks, as many as three tracks having been disrupted by one bomb. Numerous derailments and much wreckage were caused by 50 bombs which fell among the lines of rolling stock with which the yard was crowded. The engine shed also was two-thirds destroyed.

Of the other early attacks in March and early April, some of the most successful were on Paris/La Chappelle, Charleroi/St. Martin, Paris/Juvisy, Laon and Aachen. At each of these centres the locomotive servicing and maintenance facilities were rendered almost, if not completely, useless and great havoc was wrought in the marshalling yards. At Paris/Noisy-le-Sec the whole complex was almost annihilated. Other damaging attacks in this early period were made on Ottignies, Rouen, Namur, Lens and Tergnier. From the first attacks the enemy energetically set about endeavouring to make good the damage, but Trappes was still under repair as April ended.

Paralysis

Throughout May the same high degree of success was maintained, and a paralysis began to extend over the networks of the *Region Nord*, west of a line Paris-Amiens-Boulogne and South Belgium. To extend this paralysis, attacks were made, immediately before D-Day, on the eastern routes to Paris, on important avoiding routes round the south of the city, and on centres on the *Grande Ceinture*. Raids were considerably restricted to avoid heavy civilian casualties or damage to historic buildings. Thus the junction of Le Bourget was not attacked because of the strong probability of heavy civilian casualties.

"At D-Day," reported the Air Chief Marshal, "I believed the primary object of the rail plan had been fully realized. The events which followed confirmed my belief." He considered that attacks on locomotive repair depots and facilities was the main method of achieving the desired reduction in traction power. In one raid about 5 per cent of the locomotives of the *Region Nord* were put out of service. Direct attacks were also made by U.S. and R.A.F. forces on trains and locomotives on open lines. For example, on May 21st, 1944, 504 Thunderbolts, 233 Spitfires, 16 Typhoons and 10 Tempests of A.E.A.F. operated throughout the day, claiming 67 locomotives destroyed, 91 damaged, and 6 stopped. Eleven others were attacked with unknown results, and extensive damage inflicted on rolling stock.



A.E.A.F. Mitchells attack a target in Normandy. Valuable pre-invasion experience was acquired in attacking "Noball" targets (V.1 and V.2 sites).

With the capacity and flexibility of the enemy rail system destroyed, the armies were denied the freedom of movement necessary to mount decisive counter-attacks. Further, the armies and their supplies were forced on to the roads, not only slowing up movement and making them more vulnerable to air attack, but also, by compelling the use of motor transport, making the enemy draw more heavily on his precious oil and rubber. Air attacks on these road movements eventually forced him to move mainly by night.

It was planned to destroy all the principal rail and road bridges leading into the assault area, and by sealing off the area to force the enemy to stand and fight. Thus, any defeat would be decisive. A bridge is very difficult to hit and, by nature of its construction, even more difficult to destroy. Calculation suggested that approximately 600 tons of bombs per bridge would be needed if the task were entrusted to heavy bombers. In practice, it was found that about 640 tons of bombs per bridge was required. What was not at first realized was how effectively, and relatively cheaply, the task could be carried out by fighter-bombers. It was learnt from the attacks on bridges by aircraft of A.E.A.F. that a bridge could be destroyed in approximately 100 sorties (between 100 and 200 tons of bombs).

In order not to betray a special interest in the "Neptune" area, attention was paid in the preparatory phase principally to the bridges over the Seine, with some others over the Oise, Meuse and the Albert Canal, leaving to the assault phase the task of attacking bridges south of Paris to Orleans and west along the Loire.

On April 21st, 1944, the first of a series of attacks against bridges was made by Typhoons. Subsequent attacks were carried out by formations of fighter-bombers which included Thunderbolts, Typhoons and Spitfires, and by the medium bombers of the U.S. IXth Air Force. The early operations were experimental, the intention being to explore the possibilities of attacks by fighter-bombers and medium bombers against this type of target. Probably in one or two early attacks a lucky hit exploded the demolition charges, and in such cases the destruction caused was out of all proportion to the effort expended.

Over a period of about ten days prior to D-Day the intensity of the attacks increased to a crescendo, and Air Chief Marshal Leigh-Mallory attributes the success of the low-level fighter-bomber attacks of the IXth Air Force, as well as the results obtained by the medium bombers, to experience during the preparatory period. Losses were not light. The outcome of these attacks was that, on D-Day, twelve railway bridges and the same number of road bridges over the River Seine were impassable. Three railway bridges at Liège and eight others, as well as the important highway bridge at Saumur, were also unserviceable. After D-Day, the assault on bridges of tactical and strategical importance was maintained with great success.

Coastal Batteries

After paying tribute to the work of the formations detailed to attack bridges, the Air Chief Marshal describes the neutralization of coastal defences. It was essential to destroy, as far as possible, the enemy's capacity to prevent shipping from approaching the assault area, and to blind him to that approach. There were forty-nine known coastal batteries capable of firing on shipping, and it was clearly impossible for the naval forces successfully to engage all of these. Air Chief Marshal Leigh-Mallory did not consider that air attack on batteries where casemates were completed was likely to be very effective, but fortunately those in the Cherbourg area were the last to be casemated, and it was possible to attack many of them before completion. To avoid showing particular interest in the assault area, batteries as far north as Ostend were

A.E.A.F. OPERATIONS IN NORTH-WEST EUROPE

attacked, in the proportion of two outside, to one within, the area.

Photographic interpretation revealed that in a great many instances the bombing was more successful than expected, and by D-Day the majority of batteries within the area had been subjected to damaging attack. Between April 10th and June 5th, 1944, there were 8,765 sorties against coastal batteries by the A.E.A.F., U.S. VIIIth Air Force and R.A.F. Bomber Command, on which 23,094 tons of bombs and 495×60 lb R.P.s were expended.

During the hours of darkness preceding the actual assault, a tremendous air bombardment was directed on to the batteries which could not be destroyed within the assault area.

Anti-Radar

Discussing the disruption of radar cover and W/T facilities, Air Chief Marshal Leigh-Mallory explains that the enemy radar cover on the Western Front was complete from Norway to the Spanish border. The scale and variety of equipment in this organization was such that to destroy the system by air attack alone would have been a formidable proposition. This, however, was not necessary—the destruction of certain vital radars and the comprehensive jamming of others could so gravely interfere with operation as almost to make it useless. The Air Chief Marshal therefore decided to attack radar stations between Ostend and the Channel Islands in accordance with the following principles:—

(a) Radar installations which could not be jammed electronically, or were difficult to jam, should be destroyed.

(b) Radar installations capable of giving good readings on ships and of controlling coastal guns should be destroyed.

(c) Radar installations likely to assist the enemy in inflicting casualties to airborne forces should be destroyed.

(d) Two targets outside the assault area were to be attacked for every one attacked in the area.

The attacks had a dual purpose. They aided both current air operations and naval operations in the Channel, and they prepared for the assault by blinding the enemy.

On May 10th, 1944, a series of attacks was begun against long-range aircraft reporting stations, and on May 18th, on the installations used for night-fighter control and the control of coastal guns. On May 25th, forty-two sites were scheduled for attack. These included 106 installations. At D-3 fourteen sites were confirmed destroyed.

To conserve effort it was decided, three days before D-Day, to restrict attacks to the twelve most important sites; six were chosen by the naval authorities and six by the air authorities. These twelve, containing thirty-nine installations, were all attacked in the three days prior to D-Day.

Up to D-Day, 1,668 sorties were flown by aircraft of A.E.A.F. in attacks on radar installations. Typhoons in low-level attacks, flew 694 sorties and fired 4,517×60 lb R.P.s. Typhoons and Spitfires made 759 dive-bombing sorties, dropping 1,258×500 lb bombs, and light and medium bombers dropped 217 tons of bombs.

These radar targets were very heavily defended by flak and low-level attacks upon them demanded great skill and daring. Pilots of the R.A.F. Second T.A.F. were mainly employed and losses among senior and more experienced pilots were heavy. There is no doubt, however, that the attacks saved the lives of countless soldiers, sailors and airmen on D-Day.

One of the most outstanding army-support types of the war, a Typhoon is seen being loaded with 500-lb. bombs to supplement its 4×20 mm gun armament.

Two radio navigational stations important to the assault area were successfully attacked and four W/T stations of the highest importance were raided by Bomber Command. These last attacks Air Chief Marshal Leigh-Mallory describes as triumphs of precision bombing. They were on Boulogne/Mt. Couple, Beaumont Hague/Au Feure, Dieppe/Bernaval le Grand and Cherbourg/Urville-Hague; they were completely successful. The success of the last attack, on the H.Q. of the G.A.F. Signals Intelligence, must have been a major catastrophe for the enemy, and may well have been an important contributory factor to the lack of enemy air reaction to the assault.

Radio Counter-measures

Some interesting details are given of radio counter-measures. On the night of June 5th-6th, in the opening phase of the assault, counter-measures against such installations as were still active were put into operation, covering five separate and distinct tasks:—

(a) A combined naval/air diversion against Cap d'Antifer;

(b) a combined naval/air diversion against Boulogne;

(c) a jamming barrage to cover the airborne forces;

(d) a V.H.F. jamming support for the first three counter-measures;

(e) feints for the airborne forces.

Results may be summarized as follows: the enemy did not obtain the early warning of our approach that his radar coverage should have made possible; there was every reason to suppose that radar-controlled gunfire was interfered with; no fighter aircraft hindered our airborne operations; and the enemy was confused and his troop movements delayed.

Attacks on ammunition and fuel dumps, camps and H.Q.s had considerable moral effect and inflicted casualties. A number of attacks are referred to, a particularly interesting one being that by eight Mosquitoes on an ammunition dump at Chateaudun. About thirteen tons of bombs caused sympathetic detonation and the entire western wing of the dump, containing ninety buildings, was completely destroyed.

Attacks on over-land communications made coastal shipping increasingly important to the enemy, and the task of dealing with this was largely the work of Coastal Command, though Typhoons of A.E.A.F. operated on occasions.

Airfields Raided

It became necessary a few weeks before D-Day to neutralize a number of airfields within a radius of 150 miles of Caen, the primary objectives being aircraft repair, maintenance and servicing facilities. These attacks began on May 11th, 1944, and before D-Day, thirty-four of the most important airfields were attacked by 3,915 aircraft, dropping 6,717 tons of bombs, the greatest weight being dropped by the U.S. IXth Air Force. This airfield bombing was largely responsible for the lack of enemy air interference with our landings.

Air Chief Marshal Leigh-Mallory credits the Photographic Reconnaissance Units of the Allied Air Forces with being the first to begin active and direct prepara-

A.E.A.F. OPERATIONS IN NORTH-WEST EUROPE

tion for the invasion. Photographic coverage of the entire coastline from Holland to the Spanish frontier was obtained to gather full details of the coastal defences. Verticals and obliques were taken of beach gradients, obstacles and defences. This very large coverage served to hide our special interest in the selected assault beaches.

Obliques were taken at wave-top height, three to four miles out from the coast, to provide the assault coxswains with a "landing craft view" of the particular area to be assaulted. Then obliques were secured 1,500 yards from the coast at "zero feet," to provide platoon assault commanders with recognition landing points. Further obliques were taken again at 1,500 yards from the shore, but from 2,000 feet to provide, for those who were planning the infantry assault, views of the immediate hinterland.

Inland strips were photographed behind the assault areas, looking southwards, so that infantry commanders could pinpoint themselves after they had advanced. Again, it was necessary to photograph hidden land behind assault areas so that infantry commanders would know the type of terrain behind obstructions.

River bridges were photographed and special attention was paid to the river banks to enable the engineers to plan the type of construction necessary to supply temporary bridges in the event of the enemy blowing up the regular bridges.

It was also necessary to cover all the likely dropping areas for the use of the airborne divisions, and to pay special attention to each area for concealed traps such as spikes, etc. These traps were observed on photographs of many sites chosen and it was necessary to make other plans. Flooding areas, too, were all photographed at different periods. In the two weeks prior to D-Day, one R.A.F. Mobile Field Photographic Section alone made for the Army more than 120,000 prints. Many small-scale sorties were flown for Combined Operations, enabling them to make landings at selected spots long before the real offensive was launched and to bring back vital information. Allied landing craft, equipment and stores in the United Kingdom were photographed to facilitate experiments with camouflage.

Medium-Low P.R.

There was an urgent need for a medium-low altitude P.R. aircraft to supplement the high-altitude types, and some Mustang fighters were converted for tactical and strategical medium-low altitude photography with oblique cameras.

Low altitude recce., however, was at all times a hazardous business in view of the risk of being jumped by enemy fighters. None the less, early results achieved were very encouraging and eventually a number of reconnaissance squadrons were partly re-equipped with converted Mustangs. Their work proved invaluable, and the development of this aircraft for photographic reconnaissance work is mentioned as one of the outstanding lessons of the air war.

The value of Air Chief Marshal Leigh-Mallory's summary of "Crossbow" operations is limited, because of his lack of complete information on the enemy's plans at the time of writing. He records that it was not appreciated before D-Day that in addition to the specially constructed flying bomb "ski sites" (so called because of the shape of the supply building) there were modified sites with all the facilities of the originals except for the distinctive ski buildings and the water supply system. After D+7, the day on which the enemy first launched flying bombs, photographic reconnaissance revealed the existence of 74 of these modified sites. No fewer than 26,869 sorties against ski sites were made by the A.E.A.F. and U.S. VIIIth Air Force prior to D-Day and 21,483 tons of bombs were dropped. Another 2,479 sorties were flown against rocket sites (8,291 tons of bombs) and 1,018 against supply sites and dumps.

The total number of sorties flown on missions of all kinds between April 1st and June 5th, 1944, (the period of preparatory operations) was 200,639, of which 195,255 were flown by the A.E.A.F., R.A.F. Bomber Command and the U.S. VIIIth Air Force, the remainder being flown by Coastal Command.

Air Chief Marshal Leigh-Mallory discusses the actual assault on the European fortress in some detail and sets out the order of battle of the A.E.A.F. in the following table:

Type	U.S. Forces	R.A.F.	Grand Total
Medium Bombers ...	532	88	620
Light Bombers... ...	194	160	354
Fighter and F/Bs. ...	1,311	2,172	3,483
Transports	1,166	462	1,628
Recce. Aircraft ...	158	178	336
Art. Obs. Aircraft ...	—	102	102
A.S.R. (Miscellaneous)	—	96	96
Powered A/C Total ...	3,361	3,258	6,619
Gliders	1,619	972	2,591
Grand Total	4,980	4,230	9,210

The task of assisting the naval forces to protect the passage of the assault armies from surface and U-boat attack, was undertaken chiefly by R.A.F. Coastal Command though aircraft of A.E.A.F. assisted. A line of patrols was provided at either end of the Channel and the protection thus afforded contributed much to the safety of the Allied shipping from both surface and underwater attack by enemy naval forces.

Fifteen squadrons of fighters were detailed to protect the shipping lanes. These flew 2,015 sorties during D-Day and D+1, the cover being maintained at six-squadron strength throughout the period. Owing to the lack of enemy reaction, the cover was reduced to a two-squadron force.

R.A.F. Bomber Command commenced the bombardment of ten heavy coastal batteries in the assault area, and as the bombers left the area U.S. VIIIth Air Force heavies took over the bombardment. In the thirty minutes immediately preceding the touch-down hour, 1,365 heavy bombers attacked selected areas in the coastal defences, dropping 2,796 tons of bombs. The result of these operations added to the previous air bombardment and combined with the naval shelling, neutralized almost all of the shore batteries and the opposition to the landings was very much less than was expected.

Medium, light and fighter bombers then took a hand in the attacks on the enemy defensive system by attacking artillery positions further inland and other targets in the coastal defences. The VIIIth Air Force flew 2,627 heavy bomber and 1,347 escort and offensive fighter sorties during the day.

In the naval bombardment, aircraft of A.E.A.F. played an important role. The Fleet Air Arm had stated early in the planning that it would be unable to find from its own resources enough aircraft to provide for spotting for the guns of all the capital ships it was planned to use. Accordingly, despite the unfortunate diversion of effort from air resources that were far from inexhaustible, Air Chief Marshal Leigh-Mallory had agreed that two squadrons of Spitfires from A.D.G.B. and two wings of Mustangs from R.A.F. Second T.A.F. should be trained for this task. Thus on D-Day and subsequently, we were just able to meet the heavy calls for gunnery spotting.

Beach Patrol

Nine fighter squadrons for low cover and three for high cover continuously patrolled over the beaches and a reserve of six squadrons was kept in readiness. Night fighters patrolled during darkness, six squadrons of Mosquitos being available.

Air operations to dislocate enemy control of operations were begun on the day before the assault. This went even further than the previous attacks on the Radar chain and was intended to impede and disrupt in advance any possible enemy moves to make good the initial stage of the assault, to break up the machinery of control and signals communications and to make as difficult as possible the co-ordination of counter-attacks. Chateaux known to house German Corps and Divisional Headquarters and also German Army telephone exchanges were attacked on the evening of June 5th and through D-Day by fighters with bombs and R.Ps. These operations seriously embarrassed the enemy, both during the assault and later, when many H.Q.s were knocked out.

Airlift for airborne operations was provided by the U.S. IXth Troop Carrier Command and Nos. 38 and 46 Groups, R.A.F. A few S.A.S. troops were dropped by 38 Group in selected areas before and after D-Day for special duties. All airborne forces and re-supply missions which were flown in daylight were given adequate fighter cover.

An elaborate table sets out the numbers of sorties made by all classes of aircraft. On D-Day these totalled 10,743 and on D+1, 11,833.

Operations subsequent to D-Day can be summarized as embracing attacks on communications, close support, attacks on coastal garrisons, fighter cover for the assault and shipping lanes, defence against flying bombs, attacks on "Crossbow" targets, defence against enemy air reaction, attacks on G.A.F. bases, operations of the First Allied Airborne Army, attacks on Naval targets, and strategical bombing.

(To be continued)

CORRESPONDENCE

The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

JOINT OWNERSHIP

Suggestion to Facilitate Private Flying

AS a firm believer in the wide possibilities of joint ownership of private aircraft as a means of enabling many more people to fly, I think that the setting up of a simple organization to facilitate this end is justified.

I therefore invite anyone in any part of Britain who would consider sharing the upkeep of any type of aircraft with others in his locality, now or in the near future, to write to me giving the type(s) of aircraft in which he is specially interested, nearest principal town, and any other relevant details.

Potential joint owners will thus be able to get in touch with others in their district with similar interests. If a permanent register of potential joint owners can be kept, I think that a useful service will be rendered to private flying.

Correspondents are asked to enclose a stamp with all enquiries!

J. HENDERSON.

94, Bellevue Road,
Edinburgh.

NAMING CIVIL AIRCRAFT

It All Began in 1920

SEVERAL of our friends in civil aviation have drawn my attention to the articles *Flight* published during November and December with regard to the naming of civil aircraft. They all think that reference might have been made to the fact that the first company to name aircraft in Great Britain was the Instone Air Line—as early as 1920.

I notice you have included in your list the Vickers-Vimy Commercial, which you rightly describe as *The City of London*, but our D.H.4s also had names, and in 1922 the complete list of names of aircraft of the Instone Air Line was as follows:—

City of London (Vickers-Vimy 10-seater, 700 h.p.).
City of Glasgow (D.H.34 10-seater, 450 h.p.).
City of New York (D.H.34 10-seater, 450 h.p.).
City of Paris (D.H.34 10-seater, 450 h.p.).
City of Newcastle (D.H.34 10-seater, 450 h.p.).
City of Chicago (D.H.34 10-seater, 450 h.p.).
City of Antwerp (Vickers-Vulcan 8-seater, 350 h.p.).
City of Brussels (D.H.18 8-seater, 450 h.p.).
City of Liége (D.H.18 8-seater, 450 h.p.).
City of Ghent (D.H.18 8-seater, 450 h.p.).
City of Liverpool (D.H.18 8-seater, 450 h.p.).

I thought you would like to be reminded of these names as they certainly made civil aviation history at the time.

ALFRED INSTONE, Vice-Chairman,
(S. Instone & Co., Ltd.).

THE FLYING CITIZEN

An "Unfortunate Error" Indeed

I AGREE with Mr. J. S. Pole's remarks in *Flight*, December 19th, relative to the daily Press treatment of aviation accidents, and am reminded of an incident illustrating the lack of thought in publishing reports of accidents or mishaps, the cumulative effect of which, though trivial when considered individually, does harm to what is still a new mode of transport.

About twelve years ago Red and White Services, Ltd., of Chepstow, took over the booking agency for passengers for a cross-Channel air ferry service between Bristol and Cardiff operated by Western Airways, Ltd., and I, as advertising manager for Red and White, flew over from Cardiff to Bristol and back on the inauguration flight, and later sent a brief account to most of the South Wales newspapers to publicize the service.

My write-up included mention of the comfort, the cheapness, and convenience of this new inter-city connection, but what I enlarged on most of all was the safety factor, pointing out that Western Airways had operated services involving a total of thousands of miles without even a mishap. My write-up was well reported in all the papers to which it was sent, but one local daily, while devoting nearly half a column to it, printed in the adjacent column a report of a French air disaster, which completely negatived the insistence on the safety factor and accident-free record of Western Airways emphasized in my article. I protested to the publication concerned and received an apology and an explanation that it was an unfortunate error in make-up.

Well, it did no harm either to Western Airways or to Red and White, but as Mr. Pole mentions in his letter, the important thing is not to draw disproportionate attention to the accident factor.

M. HUGHES,
Advertising Manager,
J. Brockhouse and Co., Ltd.

Safety Record of Airships

WITH reference to J. S. Pole's letter in *Flight*, December 19th, the memory is stirred by the even greater raw deal given to the airship by the Press.

In point of fact, the airship is the least offender of any form of transport with regard to accidents. To give a few facts, few people are aware that of the 17 rigid airships flown between the years 1917 and 1930, only two, i.e., R.38 (lost through structural failure, August 24th, 1921) and the R.101 (lost through excess weight, October 5th, 1930) were subject to disaster. In both of these cases their shortcomings were known long before they met with disaster, but owing to unfair prejudice holding up the necessary research work, nothing could prevent their end.

The aeroplane is fortunate in having every scientific assistance given her, but even so, brand new aircraft have met with a rapid end, to give a Short Shetland, and a pressurized airliner taking off, as examples.

Throughout the entire world airship accidents (over a period of 30 years of constructing all types) could be counted on the fingers of two hands.

Of the three chief airship building nations, Great Britain, America and Germany, only seven airships met with disaster in the years between 1921 and 1937. These accidents were: Great Britain (R.38 and R.101), America (*Shenandoah, Akron, Macon*, and the semi-rigid *Roma*), Germany (*Hindenburg*).

The *Hindenburg* was the only German commercial airship lost since Count Zeppelin's earliest types; of these, 13 were lost out of 25—not a bad effort for a beginning!

In this last war only one American blimp out of countless numbers used for Coast Guard work met with an accident. They still have the German LZ126 (*Los Angeles*), built in 1923, and the all-metal Z.M.C.2, of entirely American design, built in 1928.

No wonder then, the airship has had a raw deal, and the public been bamboozled.

In view of the American proposed airship operation in the new year, still more success is foreshadowed. With a speed three times faster than the *Queen Elizabeth*, and with fares as cheap as £37 10s as against the *Queen Elizabeth's* cheapest fare of £41, there is plenty of future for the airship.

J. H. R. ALLEN.

"PROSPECTS AND PORTENTS"

Appreciation from a Spüffing Admirer

AS one who had the signal honour of serving for a term or two with the admirable Dr. A. M. Spüffing during his period of research at the Montgolfier Institute, Wormwood Scrubs, may I say how delighted I was to see due recognition of his valuable work given by "Indicator" in *Flight*, December 26th.

The learned Doctor—or "Scrubby" as he was affectionately known to us small fry at the Institute—is a man of great personal charm who has always shunned rather than courted publicity. So much so, that it was some time before the nature of his earlier activities became known to the appropriate department which eventually persuaded him to take up residence at the Wormwood Scrubs establishment. Here he at first conducted a close study of cellular construction under the ægis of H.M. Government, later turning his attentions to the possibilities of the ornithopter as a handy means of getting over high walls. These experiments were, of course, carried out in the utmost secrecy and were based on the Doctor's own celebrated formula,

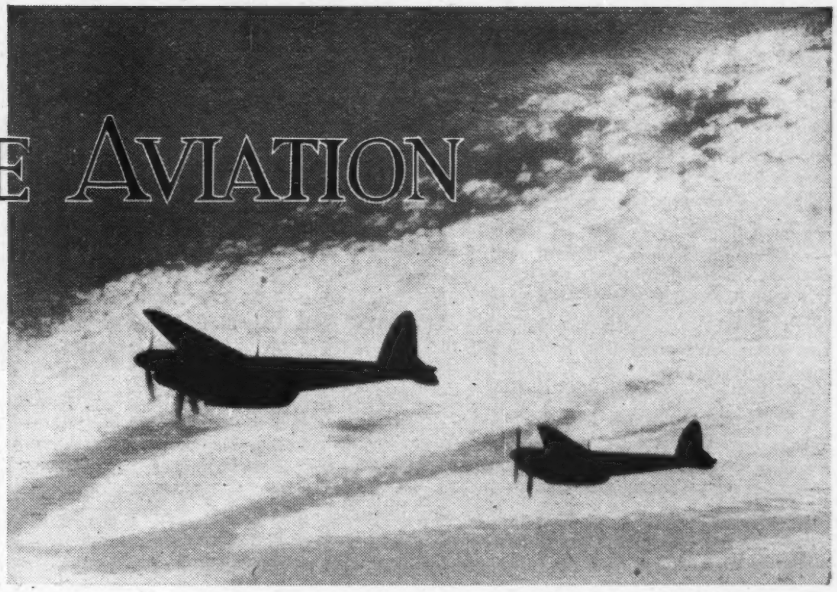
$$\frac{W^2}{8} = \pi\sqrt{o}.$$

Unfortunately, like many another pioneer in aerodynamics, the Doctor has not yet seen his efforts crowned with the success they deserve, and he is still hard at work in his Wormwood Scrubs laboratory.

W. SYKES.

SERVICE AVIATION

Royal Air Force and Naval Aviation News and Announcements



SAILORS IN SILHOUETTE: De Havilland Sea Mosquitos of No. 811 Squadron. This type is a torpedo, bomber and reconnaissance aircraft of outstanding performance.

"Flight" photograph.

Appointment

AIR VICE-MARSHAL L. F. PENDRED, C.B., D.F.C., has been appointed Senior Air Staff Officer, H.Q. Air Command, Far East.

Historian's View of the War

AT the R.U.S.I., Whitehall, on January 22nd, 1947, at 3 p.m., Mr. Arthur Bryant will lecture on "An Historian's View of the War." The chair will be taken by Air Chief Marshal Sir Robert Brooke-Popham, G.C.V.O., K.C.B., C.M.G., D.S.O., A.F.C.

Naval Air Appointment

IT is announced that Rear Admiral G. E. Creasy, C.B., C.B.E., D.S.O., M.V.O., is to be Rear Admiral Aircraft Carriers and Air Stations, British Pacific Fleet and East Indies, in succession to Rear Admiral A. R. M. Bridge, C.B.E., the appointment to date from February, 1947.

"Illustrious" Sea Hornet

A DE HAVILLAND Sea Hornet lately underwent intensive deck-landing trials in H.M.S. *Illustrious* and completed 97 landings before going unserviceable.

Cross-Channel Meteor

FLIGHT of December 26th, 1946, recorded the flight of Lieut. J. Bridge in a Meteor IV from Le Bourget to Croydon in 23 minutes 37 seconds. More details of the trip are now available.

Met. forecasts on December 18th predicted fair conditions, but with a possible change for the worse. Lieut. Bridge decided, therefore, to take-off without further delay. Leaving Toussous le Noble, he first flew over Le Bourget for time-checking, after which the Meteor climbed to 15,000ft, at which altitude the Channel crossing was made. Ground haze prevailed over the French mainland and Channel, with a 40 m.p.h. south-westerly wind, and over the British Isles 8/10 cloud conditions necessitated flying at 500ft.

Due to extremely poor visibility over the London area and to the speed at which the Meteor was flying, Lieut. Bridge was unable to pick up a landmark until over the Thames estuary near Tilbury. This necessitated turning back and coming in on Croydon from a different direction, thereby causing a loss of time of at least three minutes.

The Meteor IV was in all respects a completely equipped standard aircraft and was flown with a full 180-gallon ventral tank in position. Over a greater part of the journey a speed of 590 m.p.h. (true) was being maintained.

Australia—New Zealand in 3 hr. 43 min.

THE Royal Australian Air Force Mosquito which lately did the Australia-New Zealand trip in 3 hr 43 min, beating the previous best time by 50 min, was a Mark 40, Australian-built equivalent of the R.A.F. Mark 6 fighter-bomber.

Appointments

THE Air Ministry announces the following Royal Air Force appointments:—

Air Vice-Marshal R. S. Blucke to be Senior Air Staff Officer, Air Headquarters, India.

Air Vice-Marshal V. E. Groom to be Director-General of Manning, with effect from January 1st.

Air Vice-Marshal Blucke was commissioned in 1915 in The Dorset Regiment, in which he served until he transferred to the Royal Air Force in April, 1918. He has been Air Officer Commanding No. 1 Group since February, 1945.

Air Vice-Marshal Groom, who has been Air Officer in Charge of Administration, Flying Training Command, from August, 1945, enlisted as a private in The London Regiment in 1916, was commissioned in The West Yorkshire Regiment in 1916, and transferred to the Royal Flying Corps in January, 1918. He succeeds Air Vice-Marshal Sir John Cordingley, who is now retiring.

Medan Handed Over

MEDAN airfield, Sumatra, has been handed over by the R.A.F. to the Dutch Air Force.

Nottingham Air Squadron Dinner

REPRESENTATIVES from Air Ministry and from Cambridge, London, Manchester, Glasgow, Aberdeen, Birmingham and Leeds University Air Squadrons, University College, Nottingham, and Loughborough College, attended the first annual presentation dinner of the Nottingham University Air Squadron on December 12th.

W/Cdr. C. Bastion, D.F.C., of Air Ministry, P.7, presenting "The Jonathon Cash Trophy" jointly to two cadets who had tied as best-all-round-cadet of the year, and presenting log-books to those cadets who had flown their first solo, enthused on the keenness of recruits who were joining the Volunteer Reserve through the Air Squadrons. He endorsed the remarks of the Chief Instructor, F/L. E. Cornish, who had stated during his welcoming address that the enthusiasm shown by undergraduates wishing to join the Air Squadron was so great that there was a considerable waiting list.

Cadet I. Clifford, who tied for best-all-round-Cadet, emphasized need for a closer liaison between the Air Squadrons and suggested the idea of an Air Squadron Air Rally or Display at some mutually convenient airfield.

R.N.Z.A.F. Recommendations

IT is reported by our New Zealand contemporary, *Wings*, that the establishment of five permanent R.N.Z.A.F. squadrons, with necessary ancillary organizations, has been recommended in a report by the present Chief of Staff, Air Vice-Marshal A. de T. Nevill. An establishment for 3,000 airmen and 420 officers is proposed, and the recommendation calls for a medium-bomber and a flying-boat squadron in the Islands Area and, within New Zealand, a medium-bomber, a flying-boat and a transport

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squadron. In addition there is provision for a Territorial Air Force, consisting of a Fighter Wing, a Bomber Wing, and a Technical Wing and for an Air Training Corps of four wings.

S.A.A.F. Spitfires

EARLY this year 136 Spitfires will be delivered to the South African Air Force. They will be flown by R.A.F. pilots to an assembly area in the Middle East where they will be collected by S.A.A.F. pilots and delivered *via* the east coast route.

Anglo-U.S. Exchange Plan

A SCHEME for an exchange of officers between the R.A.F. and the U.S.A.A.F. has been officially announced. Agreement has been reached covering the exchange of officers as students on courses or on attachment to Commands and Staff posts, and training will cover staff methods, tactics and research. Initially between 30 and 40 officers will be exchanged by each country but this number may later be increased up to 100.

So far the agreement has affected only home stations.

H.Q. R.A.F. MED/ME

APART from one or two minor branches which must necessarily remain in Cairo until the move of the main body of G.H.Q., M.E.L.F., to Fayid, Headquarters, R.A.F., MED/ME completed its move from Cairo to the Canal Zone on December 10th, 1946, thus ending an association of over thirty years between the H.Q. of the R.F.C., and subsequently the R.A.F., and Cairo.

The Middle East Brigade of the Royal Flying Corps was established in the former Gezira Palace Hotel, Cairo, early in 1916, under the command of Brigadier General W. G. H. Salmon, D.S.O., and this remained the headquarters until 1920, when H.Q., R.A.F. Middle East, as it had now become, was established at Villa Victoria. Here it remained until the amalgamation with G.H.Q., M.E.F., at the outbreak of war in 1939.

The new Headquarters of R.A.F. MED/ME is located at Abu Sueir and Ismailia and occupies the permanent buildings formerly used by the R.A.F. units stationed at these places.

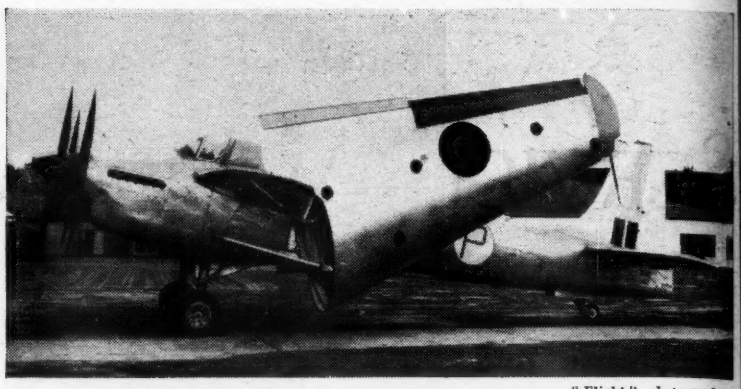
Pilots' "B" Licence Scheme

IT is now possible for pilots of R.A.F. Transport Command to study for civil flying licences in their spare time. Hitherto, many experienced pilots, including former bomber and transport captains, have found themselves on demobilization unqualified to enter civil aviation, for without the Ministry of Civil Aviation's Class "B" licence the most competent ex-R.A.F. man cannot be employed as a pilot, or obtain his master pilot's certificate.

To bridge the gap between Service flying and flying for civil aviation, Transport Command has produced a one-volume study schedule entitled *Pilots' Class "B" Civil Licences*. Intensive study of this syllabus should enable any physically fit pilot to pass the technical examination for his civil ticket. Three hours' work a day, for five days a week, allows the entire course to be completed in less than a month.

The examination covers radio direction-finding, control and procedure, lights and signals, navigation, meteorology, air legislation, and knowledge of Notices to Airmen. One concession to the value of war experience is that practical flying-tests will be waived, on production of a satisfactory R.A.F. logbook.

Prospects in civil aviation are good for men with Service training and background. The main air transport corporations and charter companies are already in urgent need of qualified pilots, but a "B" Licence is essential.



"Flight" photograph.

STOWED STURGEON: The Sea Mosquito, seen on the previous page, is an adaptation of an R.A.F. fighter-bomber, but the Short Sturgeon, shown with wings folded, was designed primarily for Naval requirements.

Reconstitution of King's Flight

THE Air Ministry announces:—

H.M. The King has approved the reconstitution of the King's Flight of the Royal Air Force and the reappointment of Air Comdre. E. H. Fielden, C.B., C.V.O., D.F.C., A.F.C., as Captain of the King's Flight. The Flight is based at R.A.F. Station, Benson, and Viking aircraft have been allocated for its equipment.

Two Vikings have been prepared for the personal use of Their Majesties. The Flight will leave for South Africa towards the end of January and is due to be at Capetown when the Royal party arrives.

Search in Norway

R.A.F. officers have recently spent 10 months in Norway in search of R.A.F. aircrew and their aircraft lost and missing over and off the coast of Norway during the war. These officers were members of the Missing Research and Enquiry Service, an organization set up by the Air Ministry soon after the war under the overall command of G/C. E. F. Hawkins, D.S.O., who, with his team of officers, has initiated and in many cases completed, search operations throughout France, Germany, Belgium, Luxemburg, Holland, Denmark and Norway.

Under the command of S/L. H. Scott, D.F.C., and afterwards of S/L E. L. Houghton, six Search Officers continued their work through the winter of 1945/6 in conditions of extreme cold and snow, covering many thousands of miles over dangerous ice-covered roads. As a result of their efforts, the total number of Allied airmen now lying in cemeteries in Norway amounts approximately to 500. Of these only a very few will remain "unknown."

The largest concentrations are at Sola Cemetery, Stavanger; Mollendahl Cemetery, Bergen; Stavne Cemetery, Trondheim (where there are 137 graves); Vestre Gravlund, Oslo; and Rosseb Cemetery, Haugesund. Before concentration was carried out there were some 120 burial places for aircrew. These have now been reduced to approximately 50.

A large proportion of aircraft losses were on anti-shipping strikes along the coast from the South-West tip of Norway, thinning out north of Trondheim, but continuing right round to the Russian border. These losses were borne mostly by 18 Group (Coastal Command, by 38 Group (Transport Command) on supply dropping missions, and by Bomber Command, engaged on attacks against the *Tirpitz*, enemy occupied airfields and factories.

Reunions

IT is proposed to hold, in London, a Squadron Reunion of all past and present members of No. 38 Squadron on the evening of March 8th, 1947. Will all who wish to attend communicate with Sqn. Ldr. Price, D.F.C., Headquarters, No. 3 Group?

* * *

OFFICERS who served at Lyneham during 1943-46, when G/C. W. J. Pickard was in command, and who wish to attend a reunion dinner are asked to communicate with Hon Sec. Lyneham Reunion, 76, Southwark Street, London, S.E.1. A party has been arranged in London for Friday, January 31st.

* * *

FORMER members of 2nd T.A.F. Communications Squadron will be welcome at The Mitre Tavern, Chancery Lane, W.C.2, at 7 p.m. on February 14th and March 14th, and on the first Friday in each month thereafter. Communicate with W/C. I. J. Spencer, Room 422, Adastral House, Kingsway, W.C.2.

* * *

IT is proposed to hold a reunion dinner in London in the early part of 1947 for officers who served at the Headquarters, stations and units of No. 206 Group R.A.F. Middle East. All interested should communicate with Group Captain B. L. Blofeld, Air Ministry (P.6), London, W.C.2.